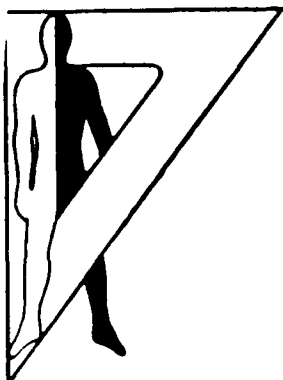


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Technical Note 12-89

**A DESCRIPTION AND USER'S MANUAL OF THE HUMAN
ENGINEERING LABORATORY FIRE SUPPORT TEST
(HELFIST) PROTOTYPE DIGITAL INFANTRY COMPANY
COMMANDER'S COMMAND AND CONTROL TERMINAL**

Mark A. Thomas
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Douglas E. Tyrol
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November 1989
AMCMS Code 612716.H700011

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JAN 26 1990
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Aberdeen Proving Ground, Maryland 21005-5001**

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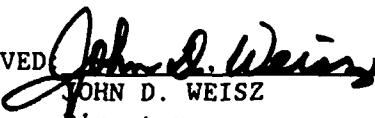
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A DESCRIPTION AND USER'S MANUAL OF THE HUMAN ENGINEERING LABORATORY FIRE SUPPORT
TEST (HELFIST) PROTOTYPE DIGITAL INFANTRY COMPANY COMMANDER'S COMMAND AND CONTROL
TERMINAL

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November 1989

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U.S. ARMY HUMAN ENGINEERING LABORATORY
Aberdeen Proving Ground, Maryland 21005-5001

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EXECUTIVE SUMMARY

The prototype company commander's terminal (CCT) is a digital communications and information processing system for infantry company commanders. The CCT was developed by the Fire Support and Target Acquisition Division (FSTAD) of the U.S. Army Human Engineering Laboratory (HEL) to test the interaction between the infantry company commander and his supporting fire support officer (FSO) in a digital communications environment.

The CCT is a computer program that acts as a communications center for the company commander. The CCT allows the company commander to communicate digitally to his fire support assets using TACFIRE FIST DMD (tactical fire direction fire support team digital message device) messages. The CCT communicates digitally with maneuver elements using messages derived from the Army Field Manual (FM) 71-1J (Department of the Army, 1977). The CCT records messages transmitted on all digital nets, allowing the commander to monitor transmissions to units other than his own. Messages sent to the commander activate a blinking message light and electronic bell. The commander or his radio-telephone operator (RTO) may format and transmit a message to any player in his subscriber table. Fire missions from forward observers (FOs), when monitored, will activate a priority message light. The CCT can operate on as many as four digital nets simultaneously.

The CCT is the commander's status board. Fire mission data from FOs such as target location, target number, and time of mission start are stored for review by the commander or his FSO. Petroleum, oil, and lubricants (POL), location, ammunition, equipment, personnel, enemy activity, and remarks for all units are updated from appropriate messages and stored for review. Unit locations and fire mission targets are displayed on a grid map to graphically show the deployment of units and their proximity to known enemy units using standard military symbology.

The CCT uses a variety of screen layouts for ease of use and consistency in the user interface. Menus or toggled controls are used when appropriate for ease of use and to minimize data entry errors. Visual and audible signaling mechanisms alert the user to incoming message traffic or an inappropriate operation. A status line at the top of the display shows the number of received and monitored messages, fire missions, and date-time-group (DTG) to the user at all times. A hard key mechanism allows the user to access priority functions such as message transmission or to review a received message from any operation in which he may be involved without going to the MAIN MENU.

The CCT allows the user to enter data using an infrared touch screen, an optical mouse, or the standard computer keyboard.

This report introduces the functions and operations of the CCT through a user's manual format. The operations of the CCT will be explained and the screen layouts will be shown at the appropriate points in the operation. The message formats used in the program are explained in detail. The program hardware and software requirements are given, and the peripheral devices such as the touch screen, the mouse, graphics support, and device drivers are explained.

A DESCRIPTION AND USER'S MANUAL OF THE HUMAN ENGINEERING LABORATORY FIRE SUPPORT TEST (HELFIST) PROTOTYPE DIGITAL INFANTRY COMPANY COMMANDER'S COMMAND AND CONTROL TERMINAL

PROTOTYPE COMPANY COMMANDER'S TERMINAL

The prototype company commander's terminal (CCT) is a computer program running on an IBM AT-compatible microcomputer. It acts as a communications center for the company commander. The CCT allows the company commander to communicate digitally with his fire support assets and his maneuver elements. The CCT enables the company commander to monitor transmissions between all the units in his subscriber table. Messages sent to the commander activate a blinking message light and an audible tone. Fire missions from forward observers (FOs), when monitored, will activate a priority message light. The CCT can operate on as many as four digital nets simultaneously. Figure 1 shows the current maneuver company communications network configuration and Figure 2 shows the digital communications network monitored by the CCT during the HELFIST pilot study.

Unit locations and fire mission targets are displayed on a grid map to graphically show the deployment of units and their proximity to known enemy units using standard military symbology.

The CCT allows the user to enter data using an infrared touch screen, an optical mouse, or a standard computer keyboard.

This report introduces the functions and operations of the CCT by using a user's manual format. The operations of the CCT are explained and screen layouts are shown at different points in the operation. The message formats used in the program are explained in detail. The program hardware and software requirements are given, and the peripheral devices such as the touch screen, the mouse, graphics support, and device drivers are explained.

A programmer's guide that includes a system flow diagram, module flow diagrams, and documentation is included in Appendix A.

HARDWARE DESCRIPTIONS

Screen Layout

This section is a discussion of the layout of the screen. The different areas of the screen are discussed with an explanation of the symbols, menus, and messages that appear in them. The screen layout of the CCT is illustrated in Figure 3.

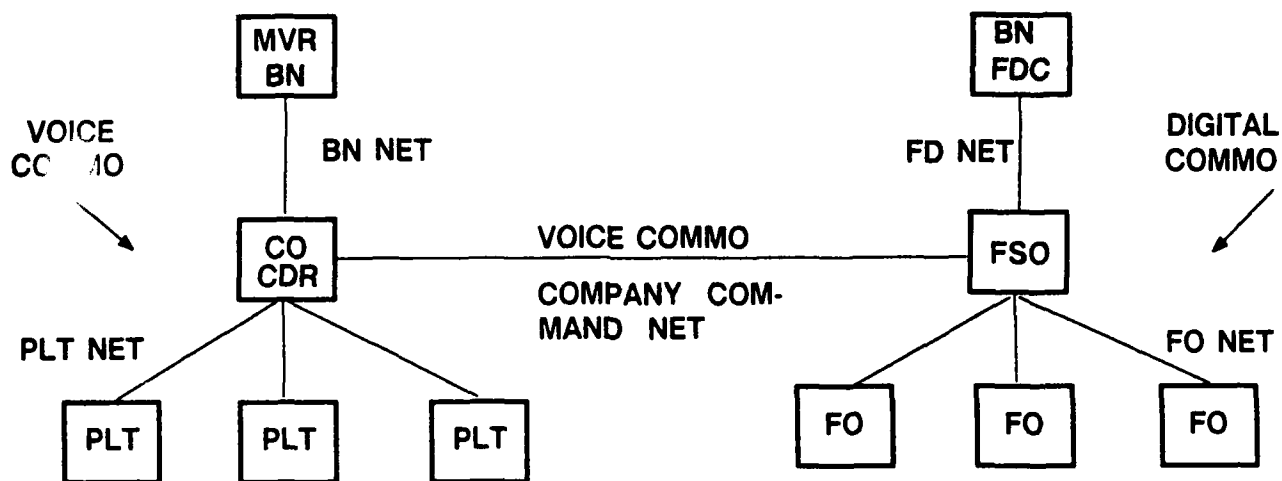


Figure 1. Current company level communications networks.

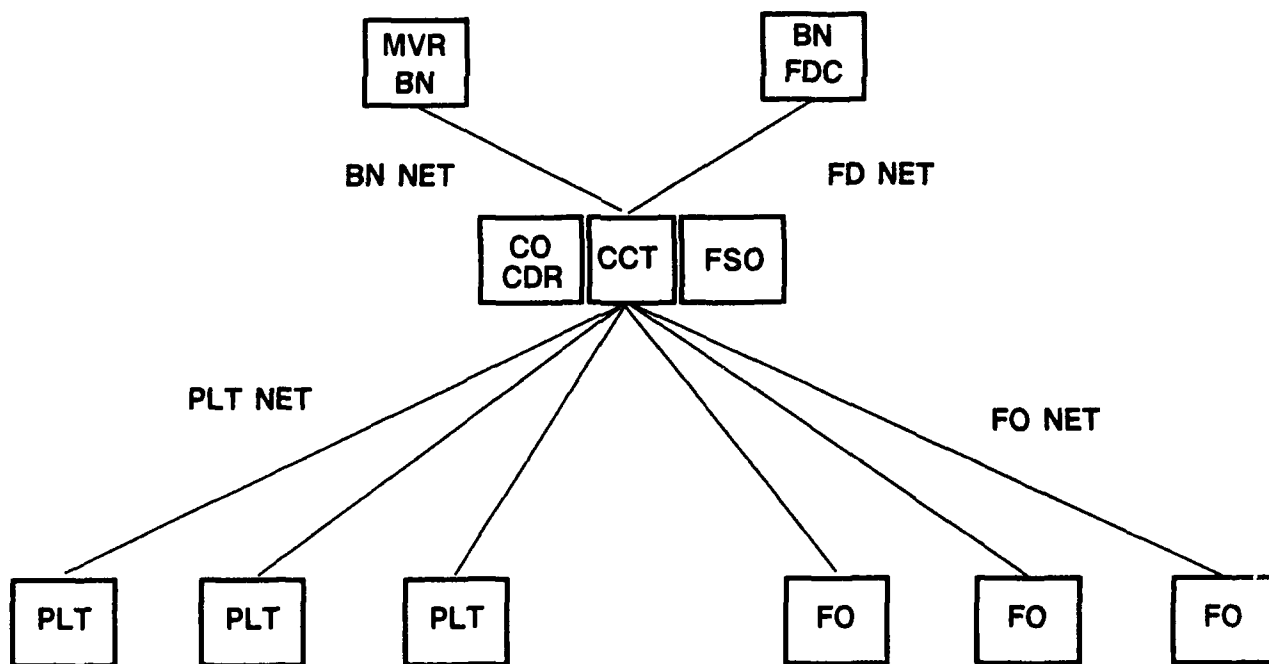


Figure 2. HELFIST digital communications network CCT monitoring.

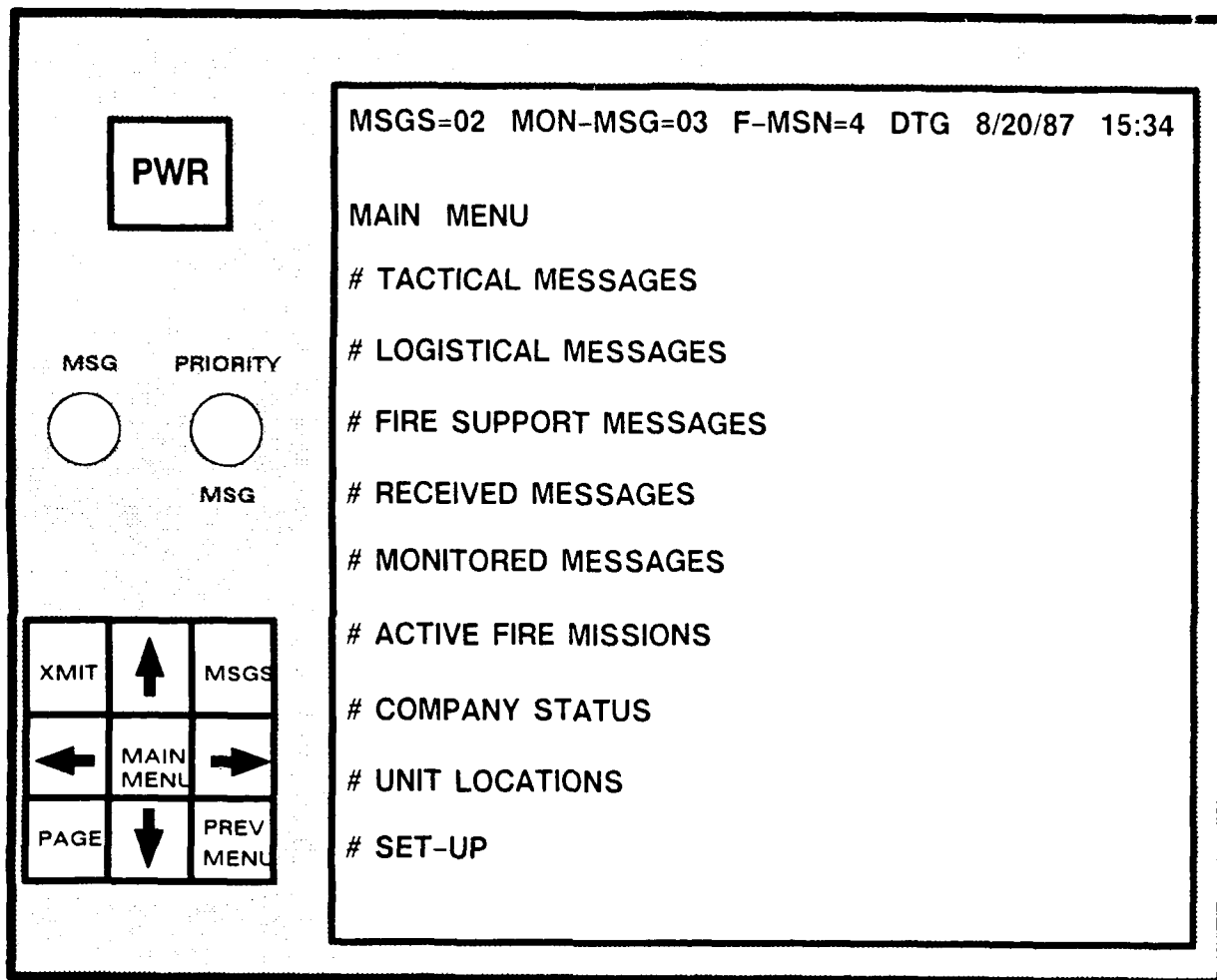


Figure 3. CCT display.

Main Operation Window

The main operation window is the "black" area of the CCT with "white" text and a "green frame" bordering it. As illustrated in Figure 4, it is the largest "boxed in" area. This is the main viewing portion where CCT information and menus are displayed. The symbols # (pound sign) and @ (at) are to the immediate left of any menu option that is available to be invoked or "picked," and the on-screen keyboard appears in this window when appropriate. All data-entry and message-processing operations are done in this window.

The @ symbol indicates options that are "toggled." Toggle values are changed simply by activating the @ symbol as opposed to invoking another option menu or using the screen keyboard for input. An example of a menu with an @ option is shown in Figure 4, the SET-UP menu. For example, in the SET-UP menu, the option "@ MONITOR FIRE MISSIONS (NO)" may occur. When the symbol @ is picked, the line is temporarily displayed in reverse video format and the option becomes "@ MONITOR FIRE MISSIONS (YES)."

Another example is setting the PREAMBLE of the digital messages. In that case, rather than toggling the field OFF or ON, the preamble value increases by 0.2 second up to 4.0 seconds and then starts again from 0.0.

The # sign indicates an option that will invoke a new menu or enter the "pick" as data for a message field. For example, in the SET-UP menu, if the # SUBSCRIBER TABLE option is activated, the current menu will disappear and a list of the current subscribers will be displayed.

When a field requires text to be entered, a keyboard and/or a numerical keypad is displayed. The keys will produce the character that is described on the key. After all the text has been entered, the ENTER key on the number pad is used to store it.

If one of the menus has more than one page to display, a message of PAGE X of Y will appear in the lower right-hand corner of the main operation window if there is no keyboard or number pad display. If the keyboard is displayed, the message is in the lower left-hand corner just above the number pad. The message PAGE X of Y means PAGE X is currently displayed of a total of Y PAGES.

Hard Keys and Soft Keys

A hard key is an option on the CCT that retains the same functional purpose at any menu level. The CCT hard keys are to the left of the main operation window. Sometimes, the hard key may have no relevance during an operation, such as the user trying to activate XMIT when viewing the terminal SET-UP. In that case, an audible "beep" sounds, and no action is incurred. All the hard keys appear as white boxes with function labels.

A soft key is any menu option with a # or @ beside it in the main viewing area or the keyboard or number pad display in the main operation window. Depending on the menu option picked, the soft key options will be different for different menus. Unlike the hard keys, if a soft key is displayed, it is always a valid option.

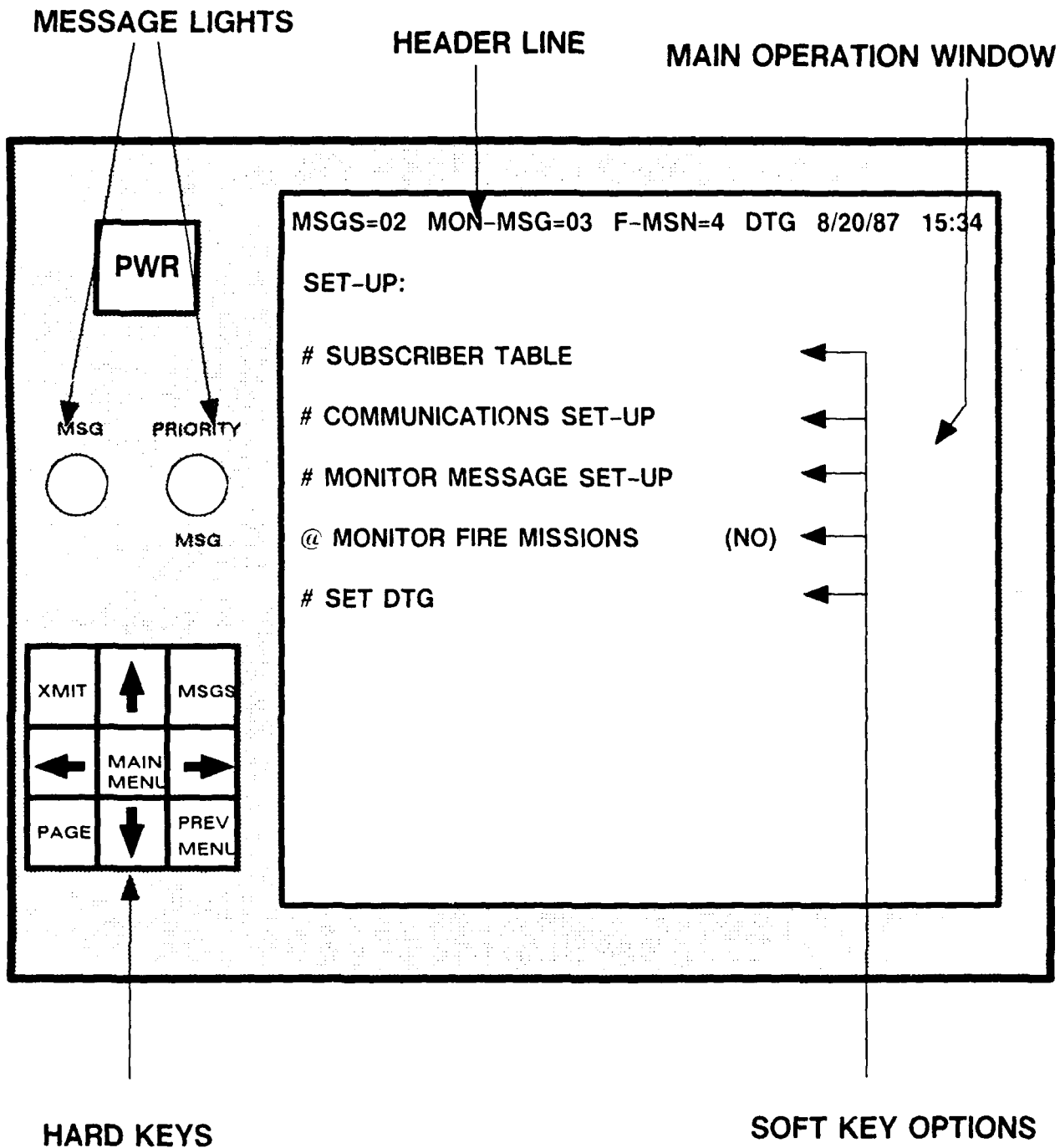


Figure 4. CCT display windows.

Both hard keys and soft keys momentarily "reverse video" when activated to provide feedback to the user that they have been picked.

Lights

The two "lights" on the CCT, the MSG light and the PRIORITY MSG light, are round. When a light is activated, it intermittently turns red, and an audible "beep" is heard.

The MSG light is activated when new digital messages addressed specifically to the CCT are received. When *all* the messages are reviewed, and the status of each message is changed from NEW(N) to REVIEWED(R) or SAVED(S), the MSG light is deactivated.

The PRIORITY MSG light is activated if the MONITOR FIRE MISSIONS option has been toggled in the device set-up. In this case, if a message is addressed to the CCT and is associated with an artillery fire mission or is information concerning possible enemy contact, then the PRIORITY MSG light will be activated. The following FIRE SUPPORT messages will activate the PRIORITY MSG light if FIRE MISSIONS are being monitored:

FRGRID

MTO

EOMSURV

The following INFANTRY messages will also activate the PRIORITY MSG light:

WARNING ORDER

SPOTREP

FRAGO

CONTACTREP

(Note. If certain message types are being MONITORED [i.e., messages not sent directly to the address of the CCT are stored in the monitored message buffer], those messages *will not* activate the message lights.)

Status Line

The line at the top of the main operation window of the CCT is the STATUS LINE. The STATUS LINE is used to display information regarding the CCT in four different categories: MSG, MON, F-MSN, and DTG.

The MSG category shows the number of received messages in the RECEIVED message buffer. There may be as many as 20 messages.

The MON category shows the number of received messages in the MONITORED message buffer. There may be as many as 20 messages.

The F-MSN category shows the number of ACTIVE FIRE MISSIONS.

The DTG category shows the month, day, year, and time. This field may be set in the SET-UP menu. The time is updated every minute.

PROGRAM REQUIREMENTS

PC/AT Configuration

The CCT runs on an IBM PC/AT-compatible microcomputer. An enhanced graphics adapter (EGA) monitor, a "mouse," and at least one RS-232 serial communications port are required. The maximum configuration should include an EGA Carroll Touch screen monitor, a mouse, and at least four additional RS-232 serial communications ports.

The CCT supports two different types of mouse. The mouse should be a Microsoft mouse or a Mouse Systems mouse. If a Microsoft mouse is used, the contents of the file "locator.dat" should be "2 1." If a Mouse Systems mouse is used, the "locator.dat" file should contain "1 1." The mouse should be connected to port COM1.

The touch screen (if available) is connected to RS-232 port COM2.

For each of the communications nets, the ports are connected via RS-232 to tactical communications modems (TCMs). In the maximized configuration, the first net starts with port COM3, and the other three consecutive nets are connected to the consecutive RS-232 ports. If no touch screen is available, the first net port is COM2.

TCM Configuration

The TCMs should be set to 9600 baud rate, 8 bits, and no parity for the RS-232 interface with the CCT. The number of data blocks should be set to a minimum of 33.

Invoking the CCT Software

Before invoking the CCT, determine whether a Mouse Systems mouse or a Microsoft mouse is being used. If it is a Mouse Systems mouse, type HALOMSMI to initialize the device driver. If a Microsoft mouse is used, ensure that the device driver "mouse.sys" has been installed in the operating system. If the computer has a RAM disk of at least 800 kilobytes (kb), the command RUN on the command line of the computer will invoke a batch file to copy all the software necessary to run the CCT program onto the RAM disk and start the CCT software. If there is no RAM disk, simply invoke the CCT software by typing the command COCDR. Appendix B contains a listing of start-up errors and their solutions, and Appendix C contains the files necessary to run the software.

Deactivating the CCT

To deactivate the CCT, type CNTL-C.

INPUT DEVICE INSTRUCTIONS

The CCT uses an infrared touch screen, an optical mouse, and/or a keyboard for data entry. The three input methods may be used in any combination that is comfortable for the user.

The touch screen is used by pointing the index finger at the item desired and touching it. The CCT will beep if the choice is inappropriate for the operation or if the item was missed.

The optical mouse works by moving it around the mouse pad. A cursor on the CCT tracks the current position of the mouse. When the cursor is on the item desired, pressing the left button will enter the item as data. Pressing the right button will reverse video the selection without entering it as data.

The keyboard works like a normal computer keyboard. Typed characters will show on the screen as appropriate. Option items, denoted by the # and @ signs, cannot be picked using the keyboard.

HARD KEY FUNCTIONS

XMIT

After a digital message *has been created*, the XMIT option will enable the CCT to transmit the message. It is only active when a message from TACTICAL MESSAGES, LOGISTICAL MESSAGES, or FIRE SUPPORT MESSAGES has been created or edited or a RECEIVED or MONITORED MESSAGE is being reviewed.

MSGs

The RECEIVED MESSAGES menu is invoked when the MSGs hard key is activated, unless the buffer is empty. It is active for all functions except within the RECEIVED MESSAGES function itself.

MAIN MENU

The main operation window displays and activates the MAIN MENU when this key is picked, from any menu level in the CCT.

PREV MENU

The PREV MENU option is picked if the user wants to return to the menu display shown just before the current menu.

PAGE

If there is more than one page of the menu displayed, the PAGE option will cause the next consecutive page of the menu to be displayed. If the page displayed is the last page of the menu, the PAGE option will start over with the first page of the menu.

UP ARROW

The UP ARROW option is active in only two modes: (1) when a message is being created, and (2) when the map is displayed.

If this option is activated when a message is *being created*, the field delimiters ('/ /') will move to the menu field immediately preceding the current menu field.

When the map is displayed, this option will "pan upward" on the display by one grid square height.

DOWN ARROW

The DOWN ARROW option is also active in only two modes: (1) when a message is being created, and (2) when the map is currently displayed.

If this option is activated when a message is *being created*, the menu field delimiters ('/ /') will move to the menu field immediately following the current menu field.

When the map is displayed, this option will "pan downward" on the display by one grid square height.

LEFT ARROW

The LEFT ARROW option has two modes of utility: (1) when alphanumeric text is being entered in a message field, and (2) when the map display is involved.

When a message is being created or edited, and a field requires alphanumeric input associated with the keyboard and/or number pad display, this option will erase the character immediately to the left and set the cursor at that location.

If the map is displayed, this option will "pan left" on the display by one grid square width.

RIGHT ARROW

The only mode of utility for the RIGHT ARROW option is with the map display. If the map is displayed, this option will "pan right" on the display by one grid square width.

CCT USER'S MANUAL

MAIN MENU

The MAIN MENU is the starting point of the CCT. The major functions of the program are accessed from here. This section will introduce the major functions of the CCT, how they are accessed from the MAIN MENU, how to reach the MAIN MENU from anywhere in the program, and the layout of the MAIN MENU.

The major functions of the CCT are

TACTICAL MESSAGES

LOGISTICAL MESSAGES

FIRE SUPPORT MESSAGES

RECEIVED MESSAGES

MONITORED MESSAGES

ACTIVE FIRE MISSIONS

COMPANY STATUS

UNIT LOCATIONS

SET-UP

The first three items in the MAIN MENU are the TACTICAL MESSAGE, the LOGISTICAL MESSAGE, and the FIRE SUPPORT MESSAGE options. All the digital messages that are created and transmitted using the CCT originate from one of these options. Choosing one of these options is the first step to creating a message.

The RECEIVED MESSAGE and MONITORED MESSAGE options are the message queues. Digital message traffic from all nets are stored here.

The next three options, ACTIVE FIRE MISSIONS, COMPANY STATUS, and UNIT LOCATIONS, are the status information options. Fire mission, unit status, and grid map data are viewed through these options.

The SET-UP option controls the way the CCT operates. Communications channel parameters, subscriber tables, monitored message configuration, fire mission monitoring, and time are set here.

The MAIN MENU may be reached by pressing the MAIN MENU hard key once or repeatedly pressing the PREV MENU hard key.

The MSGS hard key can be invoked from anywhere in the program to look at the received messages queue. The other major functions must be invoked from the MAIN MENU by pressing the # sign.

The operation of the major functions are explained in detail in the following sections.

TACTICAL MESSAGES

The TACTICAL MESSAGE option allows the user to create an infantry message of tactical significance and transmit it to another unit. Messages can be created and edited. This section will show the user the messages that may be created and their layout. The user will also see how to create, edit, and transmit a message.

The first menu displayed in TACTICAL MESSAGES is the message selection menu. The message selection menu shows the messages that can be created. The messages are selected by picking them on the # sign. The message selection menu is shown in Figure 5.

Message Layout

Each message has fields of varying length where the data are entered. Infantry message fields contain alphanumeric data. A SITREP message is shown in Figure 6.

The first line is the message header, which shows the message type, the current field where data are being entered, and the maximum number of characters that can be entered in the field.

The other lines in the example show the message fields. In this example, the fields TO, FROM, and UNIT-LOC are shown.

The number of pages in this message is displayed in the lower right corner.

Creating a Message

When a message type is picked from the message selection menu, the program places the message in the CREATE mode. A message in the CREATE format is shown in Figure 6. The CREATE mode prompts the user by automatically advancing the cursor to the next field when data are entered into a field.

In Figure 6, the field TO has right-angled '//' brackets shown. The right-angled brackets delimit the field. All characters entered will display between the brackets.

PWR

MSG

PRIORITY

XMIT	↑	MSGS
←	MAIN MENU	→
PAGE	↓	PREV MENU

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

CREATE TACTICAL MESSAGE

WARNING ORDER

SITREP

FRAGO

SPOTREP

CONTACT REP

NBC 1

NBC 4

MIJI

MINEREP

MORTARREP

OBSTACLE REP

PATROL REP

SHELREP

PASSAGE OF LINES

Figure 5. Message selection menu for TACTICAL MESSAGES.

PWR

MSG
☐

PRIORITY
☐

XMIT
↑

MSGS

←

MAIN
MENL

→

PAGE
↓

PREV
MENL

MSG=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

SITREP: TO 1-CHAR

TO - /T/

FROM -

UNIT-LOC -

ENEMY ACTIVITY -

A	B	C	D	E	F	G	H
I	J	K	L	M	N	O	P
Q	R	S	T	U	V	W	X
Y	Z	,	.	;	/	-	SPACE

1	2	3
4	5	6
7	8	9
0	ENTER	

Figure 6. SITREP message in CREATE mode.

Data are entered by picking characters using a touch screen, a mouse, or a keyboard. When all data are entered for a field, picking the ENTER key option on the number pad will save the field data. The cursor will advance to the next field, and the message header will update to the new field name and the number of characters for the new field.

There are two types of fields, numeric and alphanumeric. Numeric fields are denoted by digits on the message header (e.g., 1-DIGIT). The numeric field requires all digits specified. For example, an 8-DIGIT grid coordinate must be entered as 00809000, not truncated to the 6-digit 008900. Alphanumeric fields will accept as many characters as the field size specifies or as few as one. The ENTER or DOWN ARROW options may be pressed to skip a field.

While entering data, the LEFT ARROW backspaces and deletes characters one at a time. The DOWN ARROW moves to the next field. Data entered will not be saved if the DOWN ARROW is pressed. PREV MENU places the user in the editor.

The CREATE mode is finished when the last field is entered.

Editing a Message

To edit a message, the message must be in the EDIT mode. The EDIT mode is invoked automatically at the end of the CREATE mode or when reviewing a RECEIVED MESSAGE. Message editing is accomplished by fields. The SITREP message in Figure 7 is shown in the EDIT FORMAT.

The message header in this message only includes the message type. There is no current field. The EDIT FORMAT also displays # signs next to the fields. This indicates that the user must choose one. A field must be chosen to edit in it.

When a field is chosen, the screen is cleared and the message header will display the field name and the maximum number of characters. New data are entered as in the CREATE procedure.

The previous data in the field are cleared. To restore them, press the PREV MENU option.

Transmitting a Message

Messages in the EDIT mode may be transmitted any time during the editing session by pressing the XMIT hard key. The data that have been entered are transmitted to the subscriber address in the TO field. Messages cannot be transmitted to subscribers if they are not in the subscriber table. When the XMIT option is pressed, the message TRANSMITTING MESSAGE appears at the bottom of the screen. At the end of the preamble time, set in the set-up function, the message MESSAGE ACKNOWLEDGED or MESSAGE NOT ACKNOWLEDGED will appear, indicating the disposition of the message.

<div style="border: 1px solid black; padding: 5px; display: inline-block;">PWR</div>			MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34		
			SITREP:		
			# TO - T		
			# FROM - F		
			# UNIT-LOC - 00809000		
			# ENEMY ACTIVITY - NONE		
PAGE 1 OF 4					

MSG		PRIORITY	
<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div>		<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div>	
		MSG	

XMIT	↑	MSGS
←	MAIN MENU	→
PAGE	↓	PREV MENU

Figure 7. SITREP message in EDIT mode.

To transmit a message to *multiple addresses*, just edit the TO field to the new address and press XMIT.

Message Types and Their Fields

The messages available to the commander in the TACTICAL MESSAGE module are defined, and their fields are shown in Appendix D.

LOGISTICAL MESSAGES

The LOGISTICAL MESSAGE option allows the user to create and transmit a logistical message. The LOGISTICAL MESSAGE function operates in the same manner as the CREATE TACTICAL MESSAGE function. The LOGISTICAL MESSAGE menu selection menu is shown in Figure 8.

The LOGISTICAL MESSAGE fields are shown in Appendix E.

FIRE SUPPORT MESSAGES

The FIRE SUPPORT MESSAGE option of the CCT invokes a two-page menu and allows the user to create and edit digital messages required for artillery support of the company's mission.

When the FIRE SUPPORT MESSAGE is invoked, the first page of the main display window is displayed (see Figure 9). The second page is shown in Figure 10.

The process of creating, editing, and transmitting a fire support message is the same as for tactical messages. However, fire support messages have a different message format and are explained below.

Figures 11 and 12 show the message editor header display for fire support messages. The header line shows the MESSAGE NAME, FIELD NAME, FIELD UNITS, and DEFAULT values. In Figure 11, the default value is shown as [-]. This means that there is no predefined default and the user is to enter a number. In Figure 12, the UNITS field has a value of -. This means that the field's value is chosen from a menu, and the user does not have to do any unit conversions of the data.

The user can choose the default value for a field by pressing the DOWN ARROW hard key. If the UP ARROW is chosen, the default for the current field is entered as the value, and the previous field is displayed.

Linked Fields

Fire support messages have fields that supply input to other fields. These linked fields are edited differently than nonlinked fields. A nonlinked field may be edited without regard to field editing sequence. Linked fields, however, must be processed in the proper sequence. The CCT does not allow linked fields

PWR

MSG

PRIORITY

MSG

XMIT	↑	MSGS
←	MAIN MENUL	→
PAGE	↓	PREV MENU

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

CREATE LOGISTICAL MESSAGE

EMER AMMO REQ

RATION REQ

SPLY/AMMO/POL REQ

AMMO STATUS REP

BATTLE LOST SPOTREP

EQUIP STATUS REP

NUCREP

PERS BATTLE LOSS REP

PERS DAILY SUMMARY

POL STATUS REP

VEHICLE/EQUIP REP

Figure 8. Message selection menu for LOGISTICAL MESSAGES.

PWR

MSG
☐

PRIORITY
☐

XMIT

↑

MSGS

← MAIN MENU →

PAGE

↓

PREV MENU

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

CREATE FIRE SUPPORT MESSAGE :

FR GRID

FR SHIFT

FR POLAR

SUBQ ADJ

PREC REG

HB/MPI

EOMSURV

FL TRACE

SHELREP

ATI GRID

ATI POLAR

FR QUICK

OBSR LOC

RDR REG

FR LASER

SA LASER

MTO

FREETEXT

PAGE 1 OF 2

Figure 9. Message selection menu for FIRE SUPPORT MESSAGE (Page 1).

to be processed out of order. For example, the target type or target subtype fields are linked, with the target subtype field requiring the target type data in order to display the proper list of subtypes. If the user edits the target type field, the CCT automatically steps the user to the target subtype field for editing. If the user tries to edit the target subtype field first, the CCT displays the target type field for editing, then the target subtype.

RECEIVED MESSAGES

Any message addressed directly to the CCT will be stored in the RECEIVED MESSAGE queue, and can be displayed by activating the MSGS hard key or the RECEIVED MESSAGES soft key in the MAIN MENU. As many as 20 messages may be stored, with the newest message always displayed first. In case the message queue becomes filled with 20 messages, any subsequent message will cause the oldest message to automatically be deleted.

An example of what the RECEIVED MESSAGE header line looks like is in Figure 13. The header line gives information concerning the STATUS, who the message is FROM, the message TYPE, and the TIME that the message was received.

The STATUS field may have one of three values:

N (New)

S (Saved)

R (Reviewed)

If the message is new, the user has not looked at the message. Otherwise, the message has been reviewed. If the message is a PRIORITY message, an asterisk (*) will appear next to the STATUS code.

The FROM field shows who transmitted the message. If the origination address is given in the subscriber table, the name of the subscriber will be printed in the header. If the origin address is not in the subscriber table, the one-character address is printed.

The message TYPE line shows what type of message it is, whether a SPOTREP, FRGRID, AMMO STATUS, and so forth. A garbled message will have the message TYPE UNK DMD and will not be displayed for review.

The TIME is the time the CCT received the message.

Reviewing a Message

To review a message, the # symbol to the immediate left of the desired message header should be picked. The message will then be brought up in the EDIT mode. The message is edited the same as a CREATE message from the TACTICAL MESSAGE, LOGISTICAL MESSAGE, or FIRE SUPPORT MESSAGE categories.

PWR

MSG

PRIORITY

XMIT

↑

MSGS

←

MAIN
MENL

→

PAGE

↓

PREV
MENL

MSGS=04 MON-MSG=03 F-MSN=4 DTG 8/20/87 14:05

RECEIVED MESSAGES:

	STATUS	/FROM	/TYPE	/TIME
#	*N	/FO3	/FR GRID	/14:02
#	N	/PLT1	/MINEREP	/14:00
#	R	/PLT3	/SITREP	/13:59
#	R	/BN CDR	/FRAGO	/13:44

Figure 13. RECEIVED MESSAGES display.

After the message has been reviewed (and forwarded if desired), there are two ways of leaving the message. The user may choose either the hard key PREV MENU or the hard key MAIN MENU. If the hard key PREV MENU is pressed, two soft key options DELETE and SAVE are displayed (see Figure 14). If DELETE is picked, the message is deleted from the queue. The only way to delete a message is to pick the DELETE soft key. If SAVE is picked, the message is kept in the queue and the STATUS is changed to "S." If the hard key MAIN MENU is picked at any point in reviewing the message, it is kept in the message queue and the STATUS is changed to "R."

MONITORED MESSAGES

The CCT has the capability of storing messages not directly addressed to the CCT on any of the four nets. The CCT may be set up to monitor any or all of the three message types (tactical, logistical, fire support).

The CCT is set up to monitor messages in the SET-UP menu by picking the MONITOR MESSAGE SET-UP option. Using the options in the MONITOR MESSAGE SET-UP menu, any or all of the communications nets may be monitored, as well as any or all of the message types. To see how to set up this option, refer to the SET-UP section.

Unlike the RECEIVED MESSAGE function of the CCT, which stores all the messages that are addressed directly to the CCT, the MONITORED MESSAGE function of the CCT does not activate the message lights. (*Note. The only way to see if any messages are stored in the MONITORED MESSAGE queue is to check the CCT STATUS LINE.*) There is also no hard key function to invoke the monitored message queue. The only way to review monitored messages is to pick the MONITORED MESSAGE soft key menu option in the MAIN MENU.

Once the MONITORED MESSAGE menu is displayed, the procedures for reviewing, saving, and deleting a message are the same as for messages in the RECEIVED MESSAGE queue.

ACTIVE FIRE MISSIONS

The ACTIVE FIRE MISSIONS function displays the status of all fire missions in progress by the commander's FOs. The number of active fire missions is indicated on the status line of the CCT as F-MSN. The function gets its data automatically from the FRGRID (Fire Request Grid), MTO (Message-To-Observer), and EOM&SURV (End-Of-Mission and Survey) messages.

The ACTIVE FIRE MISSIONS function only stores one fire mission per observer at any one time.

Fire missions are automatically deleted when the EOM&SURV is transmitted by the FO.

The ACTIVE FIRE MISSIONS function has two levels: the header menu and the fire mission data screen. The header menu is shown in Figure 15.

<div>PWR</div>		MSGs=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34	
		EDIT FREETEXT:	
		# DEST: Y	
		# ORI: F	
		# TEXT: COMMO CHECK	
		# SAVE # DELETE	

MSG

PRIORITY

MSG

XMIT	↑	MSGs
←	MAIN MENU	→
PAGE	↓	PREV MENU

Figure 14. Reviewed FREETEXT message.

PWR

MSG

PRIORITY

MSG

XMIT	↑	MSGS
←	MAIN MENL	→
PAGE	↓	PREV MENL

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

ACTIVE FIRE MISSIONS:

OBSERVER	/ TGT NO	/ LOCATION	/ FIRING UNIT /
# FO1	/ AB1200	/ 71205630	/ 01 120 001 /
# FO2	/ AB1201	/ 76405632	/ 01 120 001 /
# FO3	/ AB1202	/ 74005600	/ 01 120 001 /
# FO4	/ AB1203	/ 71205630	/ 01 120 001 /

Figure 15. ACTIVE FIRE MISSIONS header display.

The observer and target location are parsed from the FRGRID message. The time the FRGRID is received is recorded as the mission time. The target number (TGT NO) and FIRING UNIT are parsed from the MTO when it is transmitted to the observer from the battalion fire direction center (FDC).

Viewing Fire Mission Data

The user can view the entire fire mission data by picking the # sign. The fire mission data screen is displayed in Figure 16.

The user can delete the mission from the queue by choosing the DELETE soft key or return to the header menu by pressing the RETURN soft key or the PREV MENU hard key.

The user cannot edit the fire mission data.

The ACTIVE FIRE MISSIONS function is exited by pressing the PREV MENU key or the MAIN MENU key.

COMPANY STATUS

The COMPANY STATUS function contains information about the location, readiness, enemy information, and friendly situation for all units in the subscriber file. Status information is updated both manually through the unit data screen and automatically from certain received messages.

The Header Display

The header display shows each unit's name, last reported location, and status code. The header display is shown in Figure 17. Status codes are

Green	(all statuses over 90%)
Yellow	(all statuses between 70 to 90%)
Red	(any status below 70%)

Additional unit headers may be viewed by pressing the PAGE hard key. Specific unit data may be viewed by pressing the # sign by the unit name.

PWR

MSG

PRIORITY

MSG

XMIT	↑	MSGS
←	MAIN MENU	→
PAGE	↓	PREV MENU

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

ACTIVE FIRE MISSIONS:

FO: FO1

TIME : 1235

TGT NO : AB1200

TGT LOCATION : 71205630

FIRING UNIT : 01 120 001

DELETE

RETURN

Figure 16. ACTIVE FIRE MISSIONS data display.

31

PWR

MSG

PRIORITY

XMIT

↑

MSGS

←

MAIN
MENU

→

PAGE

↓

PREV
MENU

MSG=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

COMPANY STATUS:

UNIT	/ LOCATION	/ STATUS
# BN CDR	/ 74003200	/ GREEN
# FO1	/ 70004000	/ GREEN
# FO2	/ 75775510	/ GREEN
# FO3	/ 73235465	/ GREEN
# PLT1	/ 70004000	/ GREEN
# PLT2	/ 75775510	/ GREEN
# PLT3	/ 73235465	/ GREEN

PAGE 1 OF 2

Figure 17. COMPANY STATUS header display.

The Unit Data Screen and Manual Editing of Information

The unit data screen shows all stored information for a unit (see Figure 18). Information stored is

NAME
STATUS CODE
TIME
LOCATION
ENEMY ACTIVITY
PERS STATUS
POL STATUS
AMMO STATUS
EQUIP STATUS
REMARKS

As the unit data screen shows, some fields have # signs. These fields may be edited by pressing the # sign. Data entry is the same as editing a message field.

Statuses are in percentages. Therefore, 100% is displayed as 1.0.

Automatic Updates From Received Messages

Information in the COMPANY STATUS is updated automatically after receiving a SITREP. The fields in the SITREP correspond exactly to the editable fields in the unit data screen. Information in the unit data screen is overwritten with the data in the SITREP. In the case of a blank SITREP field, the unit data screen information is retained.

OBSR LOC (Observer Location) messages automatically update the location field in the unit data screen.

Whenever a unit's data are updated automatically, the TIME field is changed to the time of the update.

UNIT LOCATIONS

The UNIT LOCATIONS menu provides a means of finding subscribers and editing their positions. The information is displayed textually and graphically.

<div style="border: 1px solid black; padding: 5px; display: inline-block;">PWR</div>			MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34											
MSG PRIORITY <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; margin: 10px;"></div> <div style="border: 1px solid black; border-radius: 50%; width: 40px; height: 40px; margin: 10px;"></div> </div> <div style="display: flex; justify-content: space-around;"> MSG MSG </div>			COMPANY STATUS:											
			NAME: FO1 STATUS: GREEN TIME: 1134											
			# LOCATION : 70004000											
			# ENEMY ACTIVITY: NONE											
			# PERS STATUS: 1.0 # POL STATUS: 1.0											
			# AMMO STATUS: 1.0 # EQUIP STATUS: 1.0											
			# REMARKS: N/G											
<table border="1" style="width: 100%; text-align: center;"> <tr> <td>XMIT</td> <td>↑</td> <td>MSGS</td> </tr> <tr> <td>←</td> <td>MAIN MENL</td> <td>→</td> </tr> <tr> <td>PAGE</td> <td>↓</td> <td>PREV MENL</td> </tr> </table>			XMIT	↑	MSGS	←	MAIN MENL	→	PAGE	↓	PREV MENL			
XMIT	↑	MSGS												
←	MAIN MENL	→												
PAGE	↓	PREV MENL												

Figure 18. Unit data information display.

When the **UNIT LOCATIONS** menu is invoked, each unit and the current location (in terms of easting, northing) associated with it is displayed in textual format (see Figure 19). Each of the subscribers is shown under the **UNIT** heading and the associated location under the **/LOCATION** heading. Each of the subscribers is given as a menu option so that the grid location of the subscriber may be changed. The **MAP DISPLAY** option invokes a display of the subscribers' positions visually on a map grid.

If one of the **UNITS** is picked, the user is prompted to enter a new location, which *must* be an 8-digit grid (see Figure 20). The new grid location will not be entered until the **ENTER** soft key is picked. If the **MAIN MENU** or **PREV MENU** hard keys are picked, the entered grid location will not be updated.

The MAP DISPLAY

The **MAP DISPLAY** is a graphics display of the subscribers and their positions with respect to each other according to the textual coordinates. The subscribers are displayed according to military symbology. The map may be displayed in two different scales: 1:50000 and 1:25000. The subscribers may be moved and the new positions updated in the data structure. The user also has the ability to use the arrow hard keys to "pan" to different sections of the map.


If the **MAP DISPLAY** option is picked from the **UNIT LOCATIONS** menu, the display will appear as in Figure 21. In reference to Figure 21, the unit symbols of the platoons are designated by the rectangles with three dots above them, the FOs are designated by the triangles, and the company commander (COCDR) is designated by the rectangle with the vertical bar attached to the top. The one-character identification to the upper right of each symbol corresponds to the unit's address in the subscriber table. The 1:50000 scale map is displayed initially, and is centered on the company commander's location.


Other parts of the map display may be viewed by using the **ARROW** hard keys and are shown on the display to remind the user of that capability. The "pan" mechanism allows the following: If the **UP ARROW** hard key is picked, the map display will appear in the window as if the map had been *moved upward* by one grid value (1000 meters) (see Figure 22). Similarly, if the **RIGHT ARROW** hard key is picked, the map display will appear in the window as if the map display had been *moved right* by one grid value. The same holds true for the **DOWN ARROW** and the **LEFT ARROW**.

If the **SCALE** option is picked, the map display will appear in 1:25000 scale, centered on the company commander's location. (*Note. If the display has been panned extensively to a new location, invoking the SCALE option will place the window back to the initial position. This also occurs when the map is scaled back to 1:50000.*)

If the **MOVE UNIT** soft key is picked, the display appears as in Figure 23. As soon as one of the symbols is picked, the display appears as in Figure 24, and the symbol may be moved around at will. If the user decides that the symbol should have been left in the original position, the **UNDO SYMBOL** soft key is picked. Or, if more than one symbol was moved and the user wants to return all of them to the original position, the soft key option **UNDO ALL** is picked. If

PWR

MSG


PRIORITY


XMIT

↑

MSGS

←

MAIN
MENU

→

PAGE

↓

PREV
MENU

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

UNIT LOCATIONS:

UNIT	/ LOCATION
# COCDR	/ 70004000
# PLT1	/ 70004000
# PLT2	/ 75775510
# PLT3	/ 73235465
# FO1	/ 70004000
# FO2	/ 75775510
# FO3	/ 73235465
# MAP DISPLAY	

PAGE 1 OF 3

Figure 19. UNIT LOCATIONS header display.

PWR

MSG
☐

PRIORITY
☐
MSG

XMIT	↑	MSGS
←	MAIN MENUL	→
PAGE	↓	PREV MENUL

.	2	3
4	5	6
7	8	9
0	ENTER	

MSGs=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

UNIT LOCATIONS: EDIT FO1

/ _ /

Figure 20. Editing a subscriber location.

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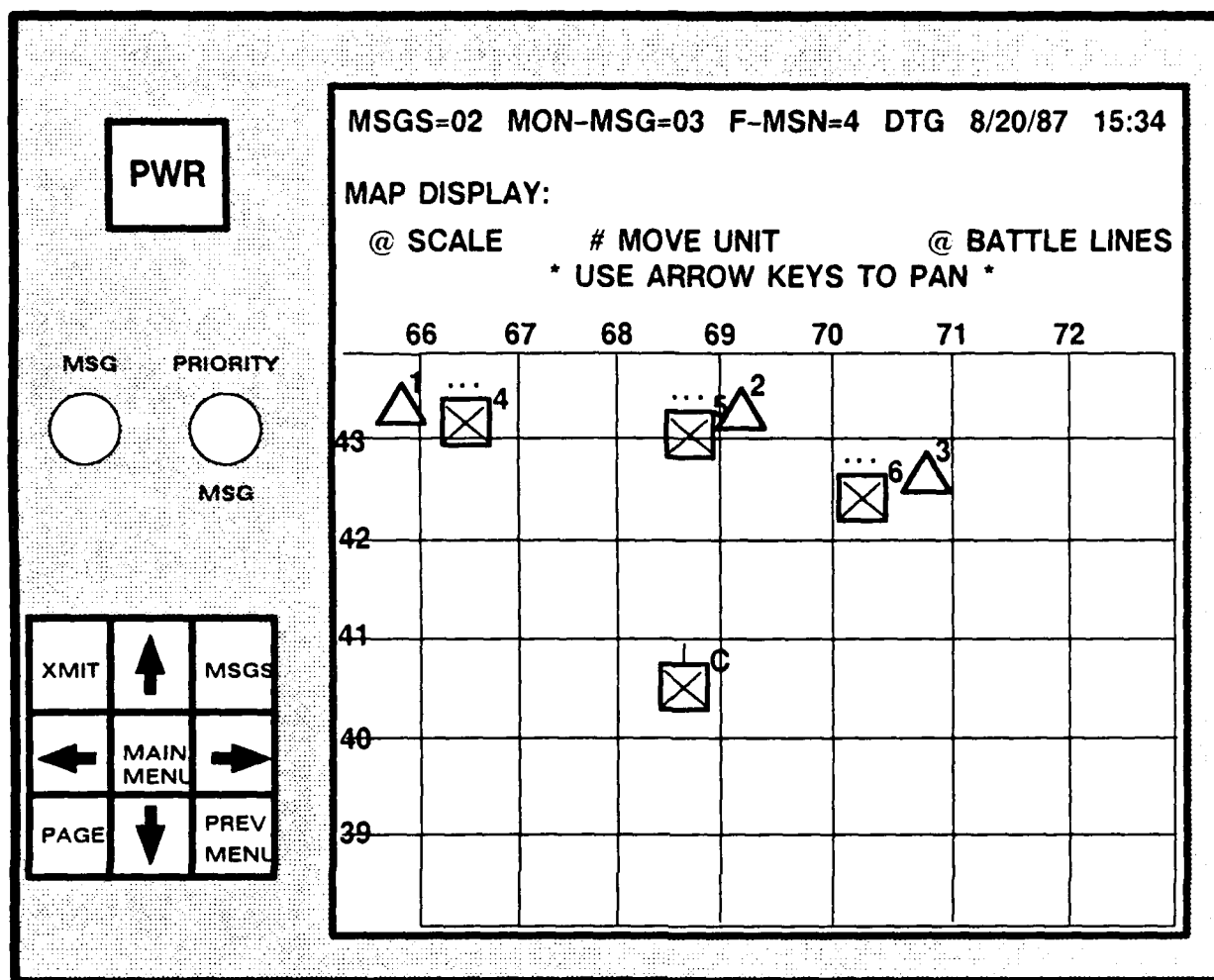


Figure 21. The CCT grid map showing unit positions.

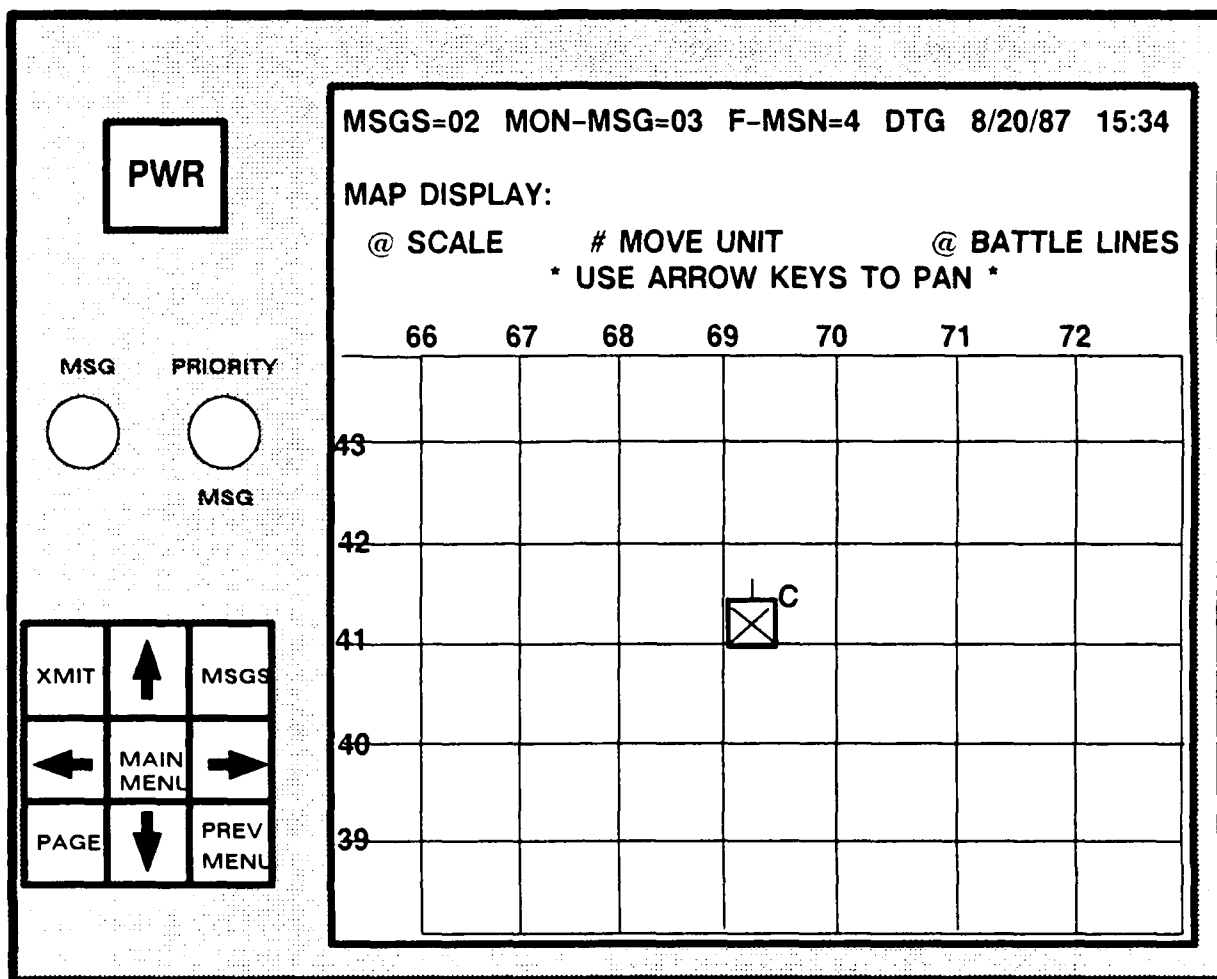


Figure 22. The CCT grid map panned with UP ARROW.

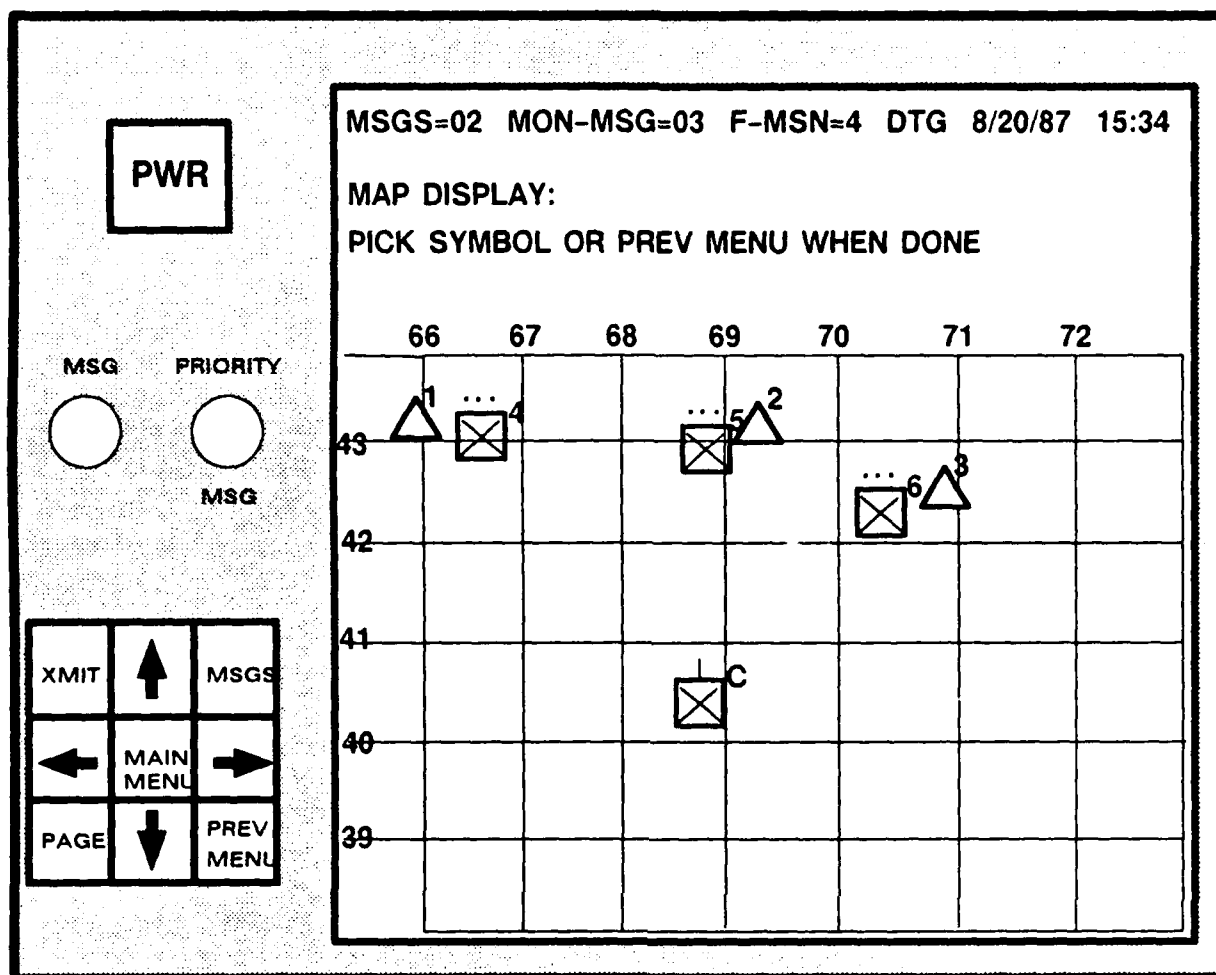


Figure 23. The CCT grid map move unit display.

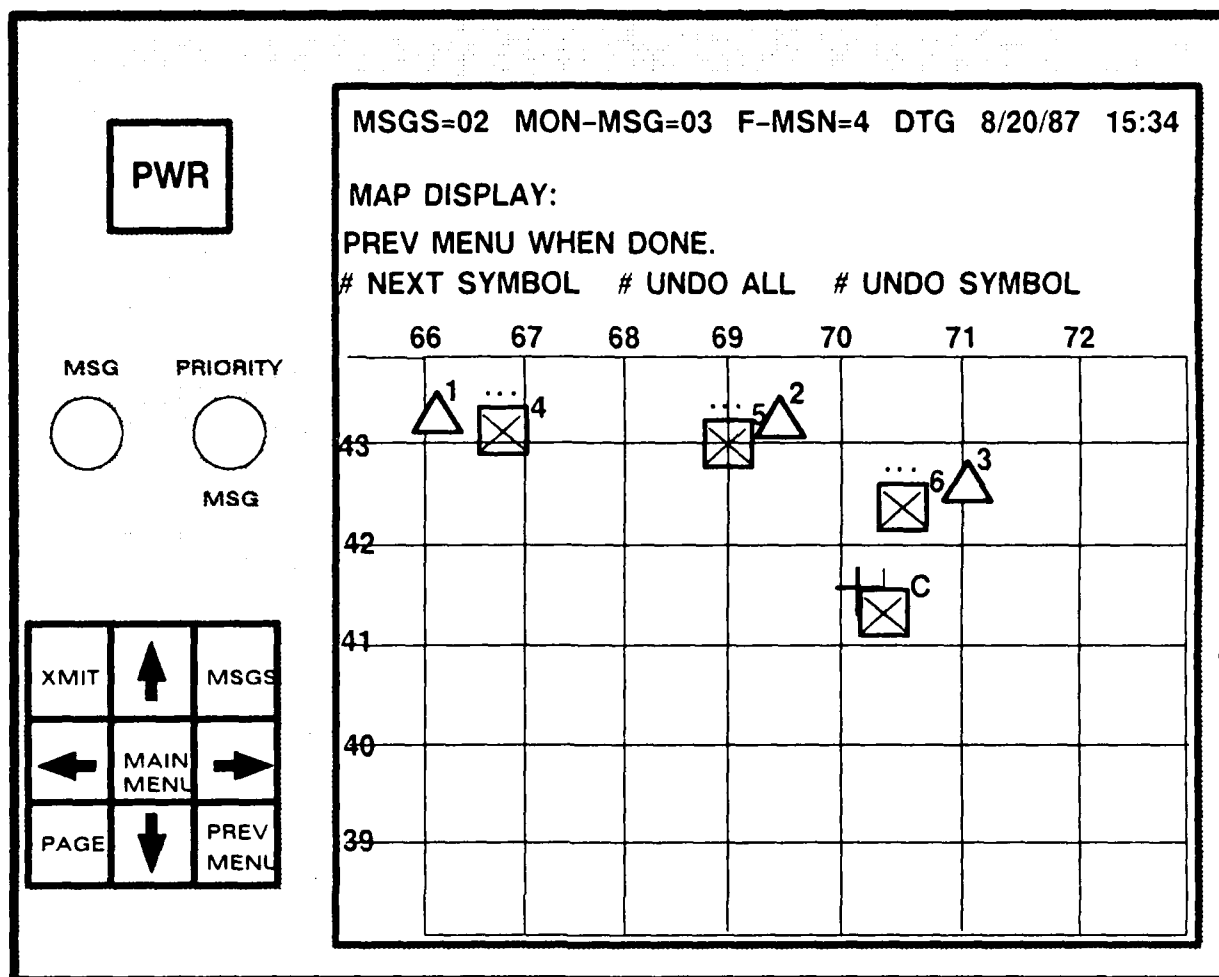


Figure 24. Moving a unit on the MAP DISPLAY.

more than one symbol is to be moved, the soft key option **NEXT SYMBOL** is picked. The **PREV MENU** hard key is picked when the user is finished moving the units around on the map.

If the symbols are moved into different positions on the map display, the new positions *may be saved* by picking the **PREV MENU** hard key. If the **MAIN MENU** hard key is picked, the new positions *will not be saved*.

SET-UP

The SET-UP menu is used to set the features of the CCT (see Figure 25). The SET-UP menu has five options, one of which is a **TOGGLE** option.

SUBSCRIBER TABLE

The SUBSCRIBER TABLE stores and displays as many as 16 subscribers and the company commander. An example of a typical SUBSCRIBER TABLE is shown in Figure 26. Each subscriber is given as a soft key menu option, and the single-character digital address **NET/ADDR** and **NAME** are displayed. Note that the company commander's address is listed in the lower left-hand corner. No **NET** is associated with that address since the CCT is able to monitor any of the four nets. The only editing that may be done to the company commander is that his address may be changed. All the other attributes are set.

If one of the subscribers is picked (e.g., **PLT1** [Platoon 1]), the display will appear as in Figure 27. Five fields may be edited: **NET**, **ADDRESS**, **NAME**, **UNIT TYPE**, and **UNIT SIZE**. The **ADDRESS**, **UNIT TYPE**, and **UNIT SIZE** fields are used to establish the correct attributes for the graphics part of the CCT to display the correct symbology. The **NET**, **NAME**, and **ADDRESS** fields are used for processing information received in the communications queues. The last option, ***DELETE***, is used to remove a subscriber from the list. If any of the first five fields needs to be edited, they may be picked and modified as desired.

COMMUNICATIONS SET-UP

The **COMMUNICATIONS SET-UP** menu is used to set the digital communications parameters and match them to a tactical communications modem (TCM). Figure 28 is a sample of the **COMMUNICATIONS SET-UP** menu. All the soft keys are toggle options. The **BLOCK** may be toggled between **SINGLE (S)** or **DOUBLE (D)**. The **PREAMBLE** may be toggled in increments of 0.2 to a maximum of 4.0, then back to 1.0 again. The **SPEED** may be toggled between **HIGH (H)** and **LOW (L)**.

MONITORED MESSAGE SET-UP

The **MONITORED MESSAGE SET-UP** is used to set up the CCT to monitor certain message types on the different nets (see Figure 29). All the soft key

<div style="border: 1px solid black; padding: 5px; display: inline-block;">PWR</div>			MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34		
			SET-UP:		
			# SUBSCRIBER TABLE		
			# COMMUNICATIONS SET-UP		
			# MONITOR MESSAGE SET-UP		
			@ MONITOR FIRE MISSIONS (NO)		
			# SET DTG		


MSG		PRIORITY	
<input type="radio"/>		<input type="radio"/>	
		MSG	


XMIT	↑	MSGS
←	MAIN MENL	→
PAGE	↓	PREV MENL

Figure 25. CCT SET-UP menu.

PWR

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34
 SUBSCRIBER TABLE:

MSG


PRIORITY

 MSG

XMIT	↑	MSGS
←	MAIN MENU	→
PAGE	↓	PREV MENU

NET/ADDR	/NAME	NET/ADDR	/NAME
# 1 /1	/FO1	# 1 /A	/BN CDR
# 1 /2	/FO2	# 1 /Y	/BN FSO
# 1 /3	/FO3	# 1 /T	/BN FDC
# 1 /4	/PLT1	# 1 /D	/BN XO
# 1 /5	/PLT2	# 1 /7	/SCOUT
# 1 /6	/PLT3	# 1 /E	/CO XO
# 1 /F	/FIST	# 1 /B	/BN S3
# 1 /M	/MTRS	# 1 /O	/B BTRY
# /C	/COCDR		

Figure 26. SUBSCRIBER TABLE display.

<div>PWR</div>		
MSG	PRIORITY	
<input type="radio"/>	<input type="radio"/>	
	MSG	
XMIT	↑	MSGS
←	MAIN MENU	→
PAGE	↓	PREV MENU

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

EDIT SUBSCRIBER:

NET: 1

ADDRESS: 4

NAME: PLT1

UNIT TYPE : MECH INF

UNIT SIZE: PLATOON

*DELETE

Figure 27. EDIT SUBSCRIBER display.

PWR

MSG
☐

PRIORITY
☐

MSG

XMIT	↑	MSGS
←	MAIN MENUL	→
PAGE	↓	PREV MENUL

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

COMMUNICATIONS SET-UP:

NET	BLOCK (S/D)	PREAMBLE (1.0-4.0)	SPEED (H/L)
1	@SINGLE	@2.200000	@HIGH
2	@SINGLE	@2.200000	@HIGH
3	@SINGLE	@2.200000	@HIGH
4	@SINGLE	@2.200000	@HIGH

Figure 28. COMMUNICATIONS SET-UP display.

PWR

MSG

PRIORITY
MSG

XMIT	↑	MSGS
←	MAIN MENU	→
PAGE	↓	PREV MENU

MSGS=02 MON-MSG=03 F-MSN=4 DTG 8/20/87 15:34

MONITORED MESSAGE SET-UP:

NET	/ MSG TYPE	NET	/ MSG TYPE
@ 1	@ FIRE SPT	@ OFF	@ FIRE SPT
@ 1	@ TAC MSGS	@ OFF	@ FIRE SPT
@ 1	@ LOG MSGS	@ OFF	@ FIRE SPT
@ 2	@ FIRE SPT	@ OFF	@ FIRE SPT
@ 2	@ TAC MSGS	@ OFF	@ FIRE SPT
@ 3	@ FIRE SPT	@ OFF	@ FIRE SPT
@ 4	@ FIRE SPT	@ OFF	@ FIRE SPT

Figure 29. MONITORED MESSAGE SET-UP display.

47

options are toggle functions. The NET fields will cycle through the values OFF, 1, 2, 3, 4, and back to OFF. The MSG TYPE fields cycle through FIRE SPT, TAC MSGS, and LOG MSGS. If the NET field is toggled from the OFF value to one of the nets, any message in the category of the MSG TYPE field that is not directly addressed to the CCT will be stored in the MONITORED MESSAGE queue. If the NET field is toggled OFF, the MSG TYPE will not be monitored.

MONITOR FIRE MISSIONS

This is a toggle soft key option that is used to set the CCT to activate the PRIORITY MSG light if a fire support message of the type described in this manual is received. If it is toggled ON, the PRIORITY MSG light will be enabled. Otherwise, only FIRE MISSION messages will activate the MSGS light.

SET DTG

The SET DTG soft key option allows the user to set the device date-time attributes of the CCT. This includes the YEAR, MONTH, DAY, and TIME.

RECOMMENDATIONS

This report represents the first version of the CCT. Later versions of the program will incorporate the following additions:

a. Graphics

The graphics capability of the CCT will be extended to allow the user to freely draw coordination, phaselines, check points, and objectives on the map and transmit them as an overlay to another unit.

A Target List overlay will be available for a quick reference of prepared targets.

The map display window will cover more area (e.g., 10 x 10 kilometers) and pan in larger map grid increments.

Instead of using symbols such as # or @ beside a menu line and reverse videoing the line when it is picked, the soft key options will be given as a "button."

b. Communications

The CCT will have the capability to send message "groups," whether by a single address set to a particular group or by listing a series of addresses on the destination field of a message.

The CCT will have a network status function that queries the subscribers and returns their operational status automatically.

c. Miscellaneous

The CCT will have a "DANGER CLOSE" alarm so that when a fire mission close to one of the company elements has been called, the user is immediately notified.

The CCT will store a created message for later review and edit.

The CCT will record more than one fire mission per observer.

(Note. For additional information, contact Mark Thomas [AV 298-5872] or Karl Schroeder [AV 298-5882].)

CONCLUSIONS

The CCT was successful as a prototyping platform for the HEL FSTAD Maneuver and Fire Support Command and Control (C²) Test. It was successfully operated by four teams of National Guard soldiers with only 8 hours of instruction given during 2 days. The operation of the CCT proved to be easy to learn and useful to combined arms operation.

The IBM PC/AT architecture has proved to be well suited for the concept development of a command and control system. The system response time to servicing interrupts from the additional communications hardware was satisfactory, and the graphics capability of the EGA card was more than adequate for the grid map displayed on the CCT.

The CCT, along with its proposed enhancements, will provide HEL researchers with the necessary command and control prototyping tool to study the complex man-machine problems associated with combined arms integration and coordination.

REFERENCES

LeLong, N. (1987). Carroll Touch infrared Smart Frame® programmer's guide. Carroll Touch, Inc.

Department of the Army. (1977, June). Field Manual on The tank and mechanized infantry company team (FM 71-1). Washington, DC: Headquarters, Department of the Army.

APPENDIX A
CCT PROGRAMMER'S GUIDE

CCT PROGRAMMER'S GUIDE

The purpose of the Programmers' Guide is to provide a technical overview of the CCT. It is intended to address the people responsible for the maintenance and updates of the CCT software. The hardware, software, and configuration described are used at the U.S Army Human Engineering Laboratory. The CCT software does not need to fit this particular configuration to run. However, the software may have to be modified at the source level if another configuration is considered.

HARDWARE ENVIRONMENT

The CCT was originally designed and implemented on the Zenith ZWF-248, an 8-Mhz IBM PC/AT-compatible computer. The program has since been tested on an 80386 equipped PC/AT, and should run without difficulty on any 80286 or 80386 type IBM-compatible computer that fulfills one of the following two configuration guidelines.

Minimum Configuration

The minimum hardware required to run the CCT is

- a. a true IBM-compatible PC/AT, equipped with two asynchronous communications ports addressed as COM1 and COM2, not superseded by other COM-type devices (such as internal modems or network cards). The RAM memory must be a full 640 K, and no Terminate-Stay-Resident programs ("Desk Accessories") should be loaded.
- b. a Microsoft mouse or compatible pointing device connected to COM1 to provide user input.
- c. a tactical communications modem (TCM) connected to COM2, in order to communicate to another device, such as another CCT or a DMD, and set to operate at 9600 baud, 32 block size (TACFIRE). If the CCT is invoked on a machine not having the required asynchronous communications ports, it will exit.

HEL CONFIGURATION

HEL's configuration consists of the following:

- a. an IBM-compatible PC/AT, as above, equipped with a standard COM1 port addressed by interrupt IRQ4, and a Digiboard Com8/s or Com4/s board. This board should be addressed by IRQ3, and the first four ports should be set to addresses (hexadecimal) x300, x308, x100, and x108.
- b. a Microsoft mouse or compatible pointing device must be connected to COM1 to provide user input.

being written first, then the major functional modules. The major functions are built on top of specialized functions which do the actual work.

The lowest level commonly accessed function of the program is the `commo_async_input` function. `commo_async_input` takes care of checking the user-input devices for data, checking the communications ports for incoming messages, calling the automatic message update functions, updating the status line, and activating the message light. The function is called from `GetChar`, causing it to be called many times per second. The other low level common function is the `GetChar` function. `GetChar` accepts input from the user-input devices by calling `commo_async_input`. `GetChar` then echoes the character to the screen and performs the character overwrite. All other user-input functions are built from `GetChar`.

The major functional components of the program (Tactical Messages, Received Messages, Company Status, etc.) each have their own specialized routines that are independent of the other major modules in the program. The program logic flow diagrams show the main logic and the specialized functions that do the actual work of the function. The program functions all lie above a lower level of functions that provide system level interaction (graphics, communications, etc.). This section will explain the major functions of the program, the program logic behind them, and the specialized functions that do the actual work.

Main System Flow

The main system flow diagram is shown in Figure A-1. The `main()` routine starts up the system by calling the `cocdr_init` function. The `cocdr_init()` function checks for the system-dependent device drivers and fonts necessary for the program to run. The `cocdr_init()` function also opens the applicable files, and parses the `screen.dat` file and sets parameters accordingly. `cocdr_init()` then initializes the window structures. If there are no problems in `cocdr_init()`, `main()` calls `cpu()`. If there are problems in `cocdr_init`, `main()` exits with the appropriate error message.

`cpu()` is the main loop of the CCT. `cpu()`'s sole purpose is the display of the MAIN MENU and the calling of the appropriate routine when picked by the user. When the routines return to `cpu()`, the MAIN MENU is displayed and the procedure continues. If `cpu()` returns, the program ends.

Create Tactical Message and Create Logistical Message

The Infantry Message Creation functions' diagrams are shown in Figures A-2 and A-3. These functions are front-end filters to the low level function `create_inf()`. `create_tactical_message()` and `create_logistical_message()` display their respective message types to the user. When the user picks a message type, the functions call `create_inf()` with a flag to indicate whether a Tactical Message or a Logistical Message is to be created and the message type code is passed as a parameter.

`create_inf()` creates and edits an infantry message. The function takes care of formatting the screen for the message, displaying the fields, accepting input to the fields, and transmitting the message. When called from

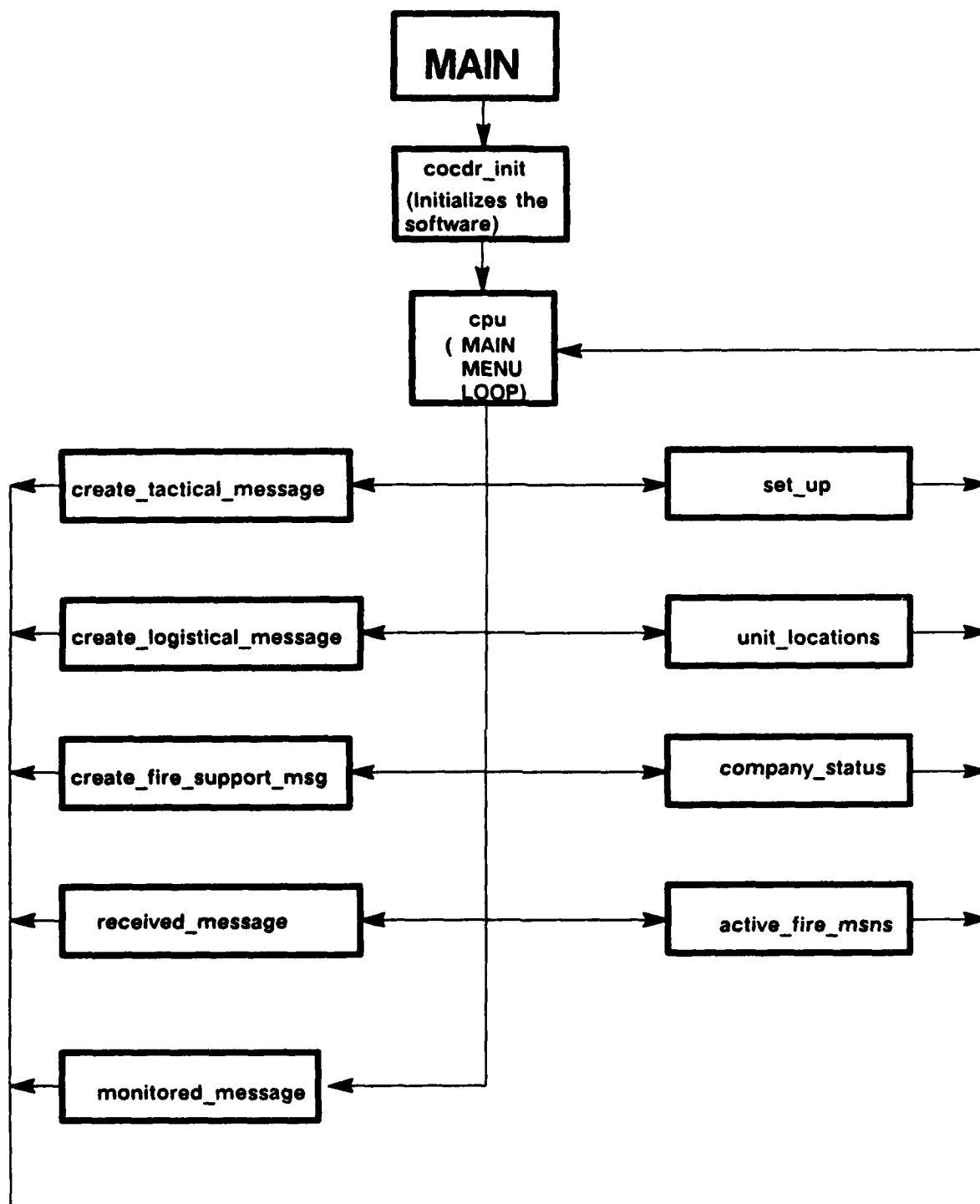


Figure A-1. Main logic flow.

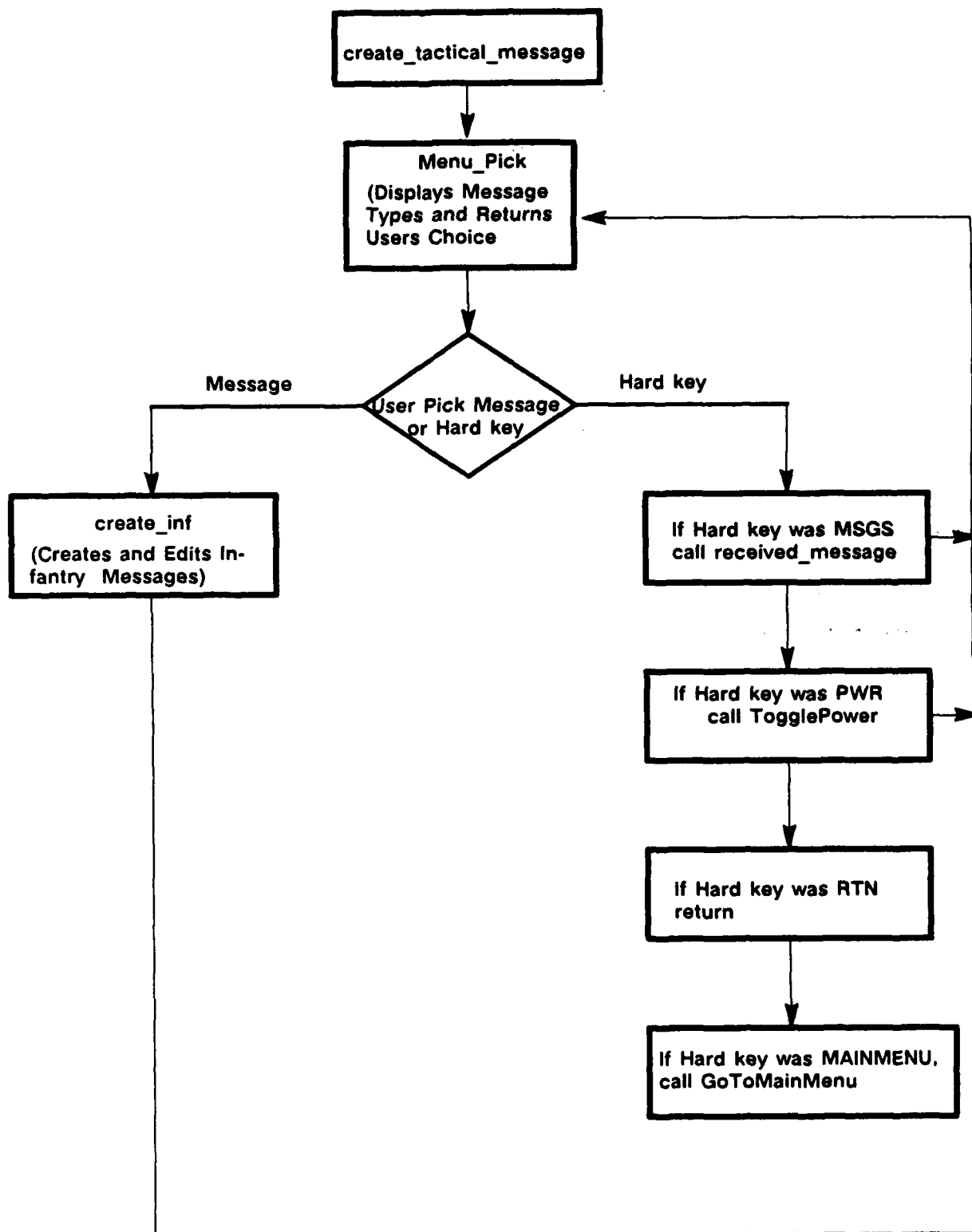


Figure A-2. CREATE TACTICAL MESSAGE logic diagram.

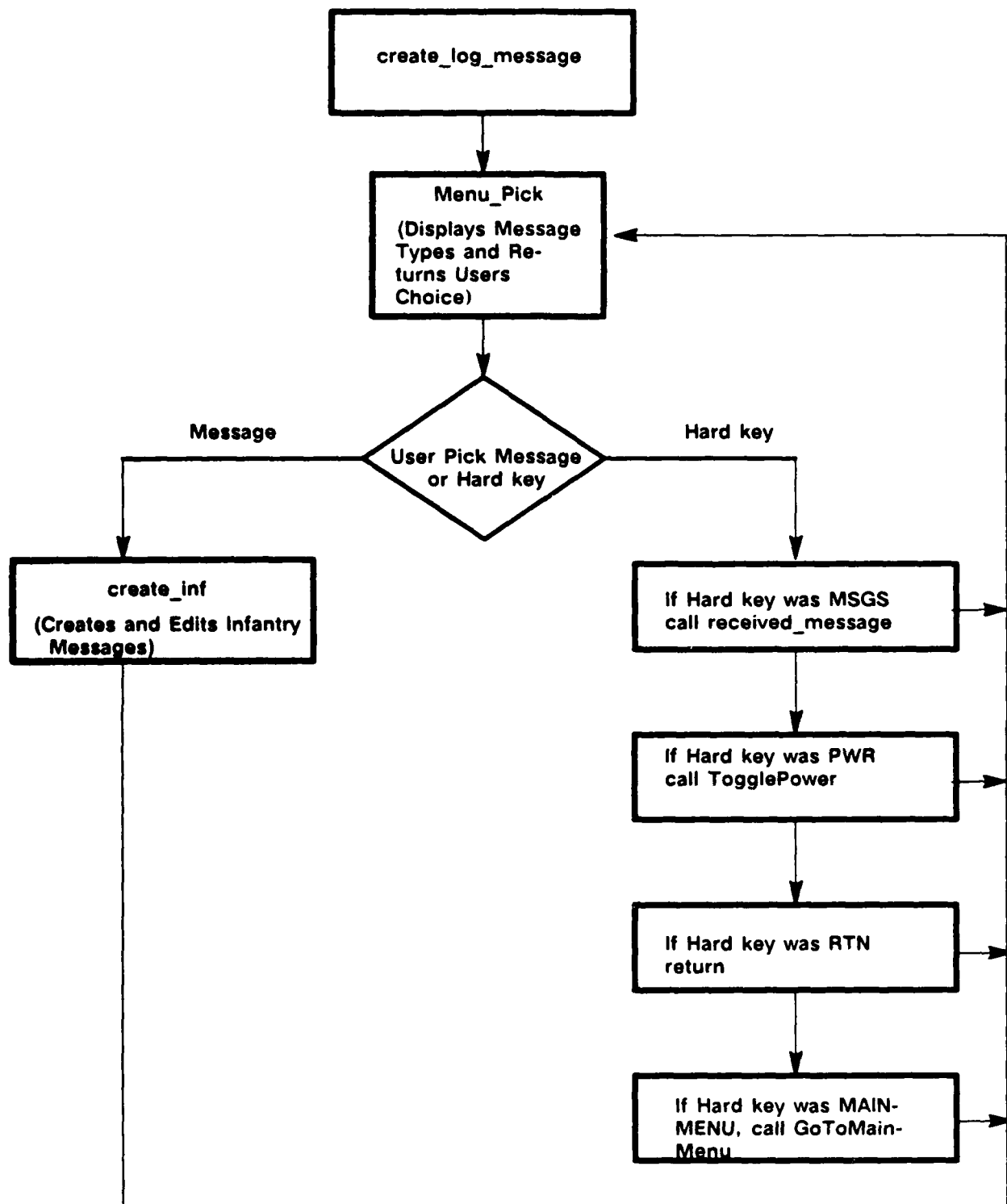


Figure A-3. CREATE LOGISTICAL MESSAGE logic diagram.

received_message(), the function immediately parses the received message string. It then calls the editor to edit the message.

The *create_inf()* function is invoked recursively when the user is creating a message and presses MSGS. The function locks out this operation when it has already been called from *received_message()*.

The Fire Support function has a *low_level* message handler named *create_dmd()*, which performs the same functions as *create_inf()* for TACFIRE DMD messages. The *fire_support_message()* function is shown in Figure A-4.

Received Message and Monitored Message

The Received Message and Monitored Message logic flow diagrams are Figures A-5 and A-6. The functions display the headers from the *r_msg* and the *m_msg* message queues respectively. When the user picks a message for review, the functions call *msg_edit()* to do the work.

msg_edit() parses the message for the message type and message class, allocates memory for the message string, then calls *create_inf()* or *create_dmd()* to edit the message. When the *create_inf()* or *create_dmd()* functions return, *msg_edit()* performs the functions of saving or deleting the message. It then returns to *received_message()*.

Active Fire Mission

The Active Fire Mission function is basically a display board. The flow diagram is shown in Figure A-7. Unlike the message modules of the other status modules, Active Fire Missions does not allow the user to edit messages. Active Fire Missions, however, must update its queue automatically from received message traffic, and this function is handled by the *proc_fire_msn()* function.

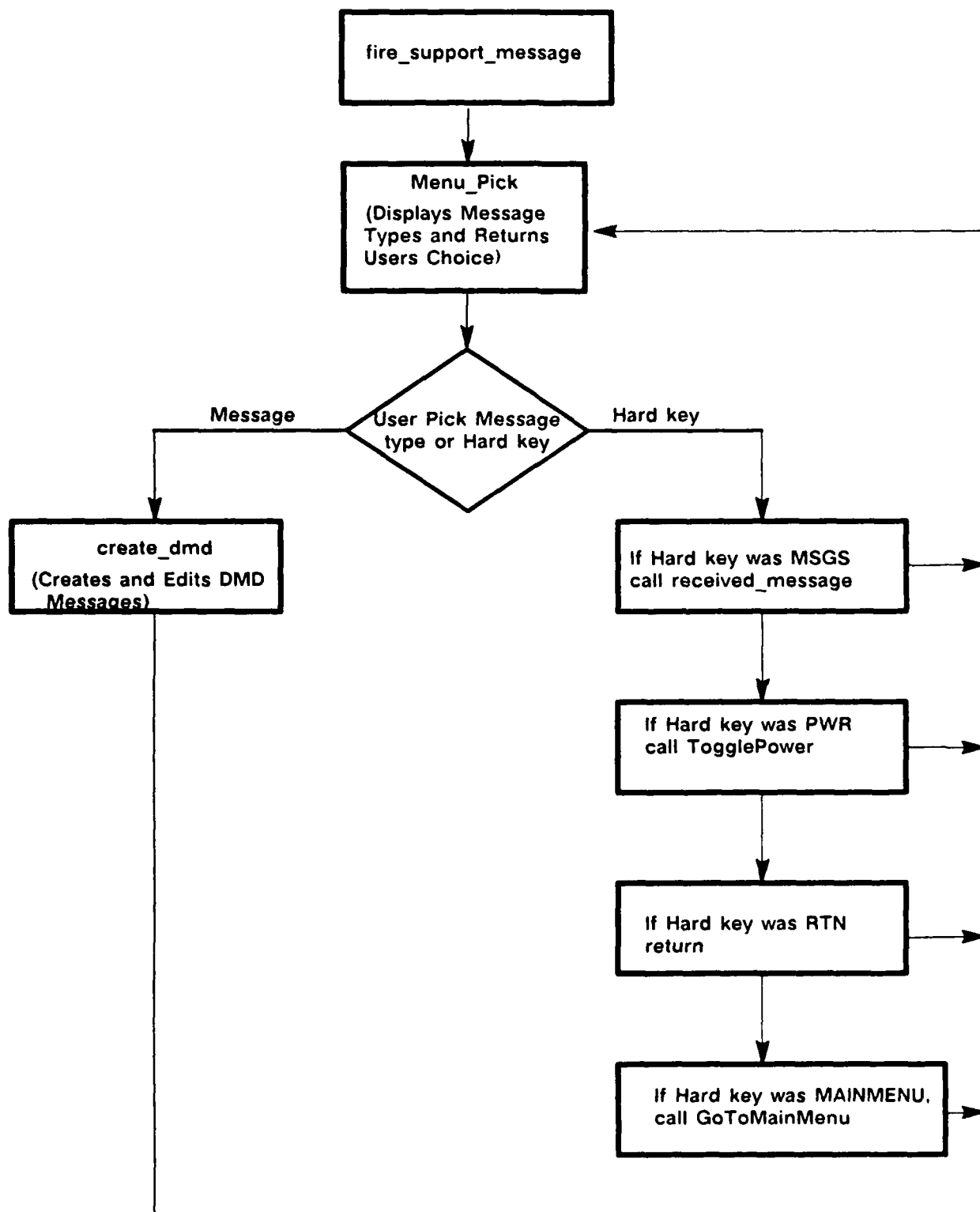
The *proc_fire_msn()* function is not shown on the Active Fire Missions logic flow because it is called by the lower level function *commo_async_input()*.

The *active_fire_mission()* function calls *edit_fire_msn()* to display fire mission data. *edit_fire_msn()* performs the save and delete functions and displays data.

Company Status

The *company_status()* function logic flow is shown in Figure A-8. The function is a front end to the *edit_platoon()* function. *company_status()* displays the header information from the *p_data* structure to the user. When the user selects a unit for view, *company_status()* calls *edit_platoon()*.

edit_platoon() displays the full unit data and allows the user to edit only the fields with a # sign beside them.



**Figure A-4. CREATE FIRE SUPPORT MESSAGE
logic diagram.**

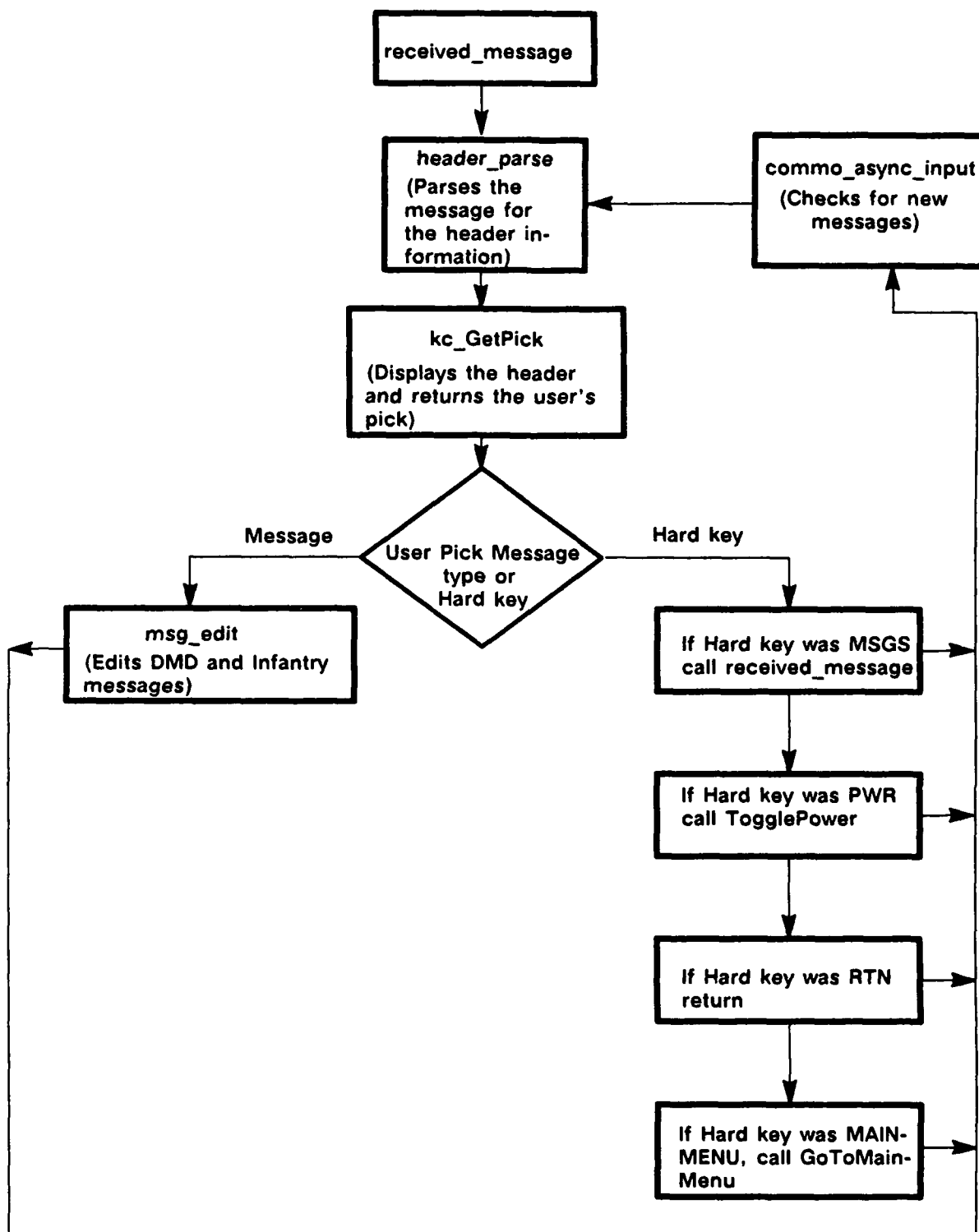


Figure A-5. RECEIVED MESSAGE logic diagram.

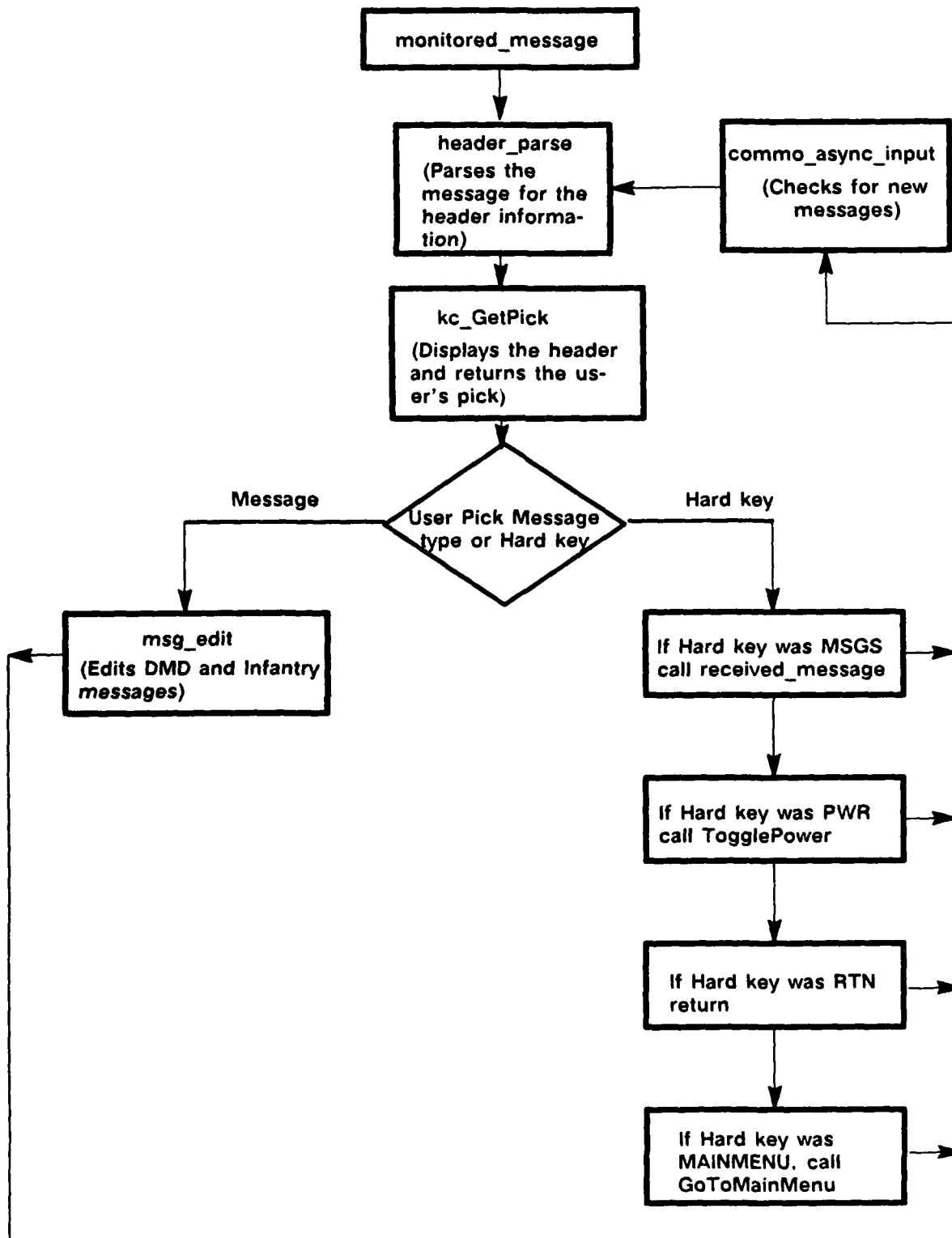


Figure A-6. MONITORED MESSAGE logic diagram.

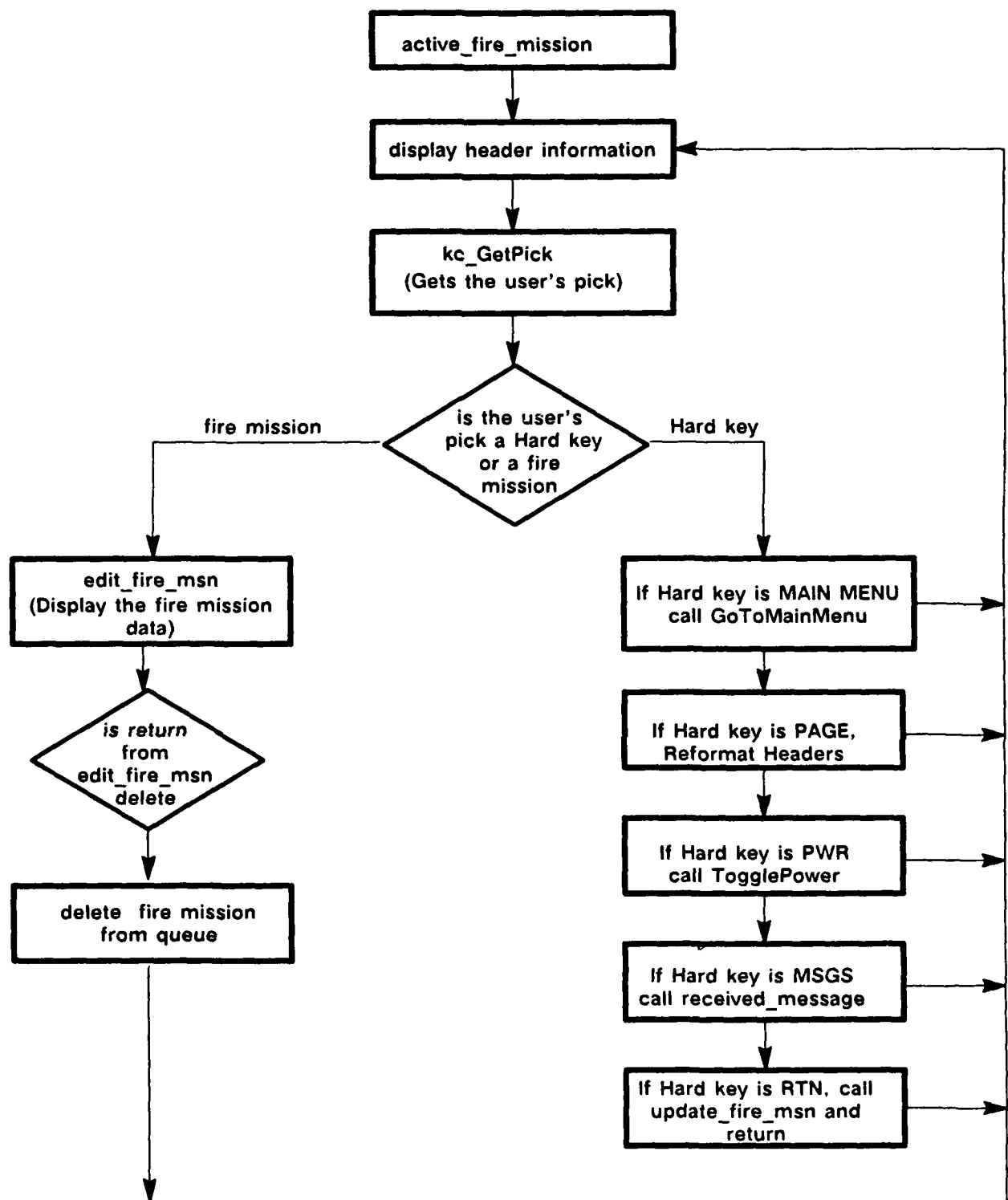


Figure A-7. ACTIVE FIRE MISSIONS logic flow.

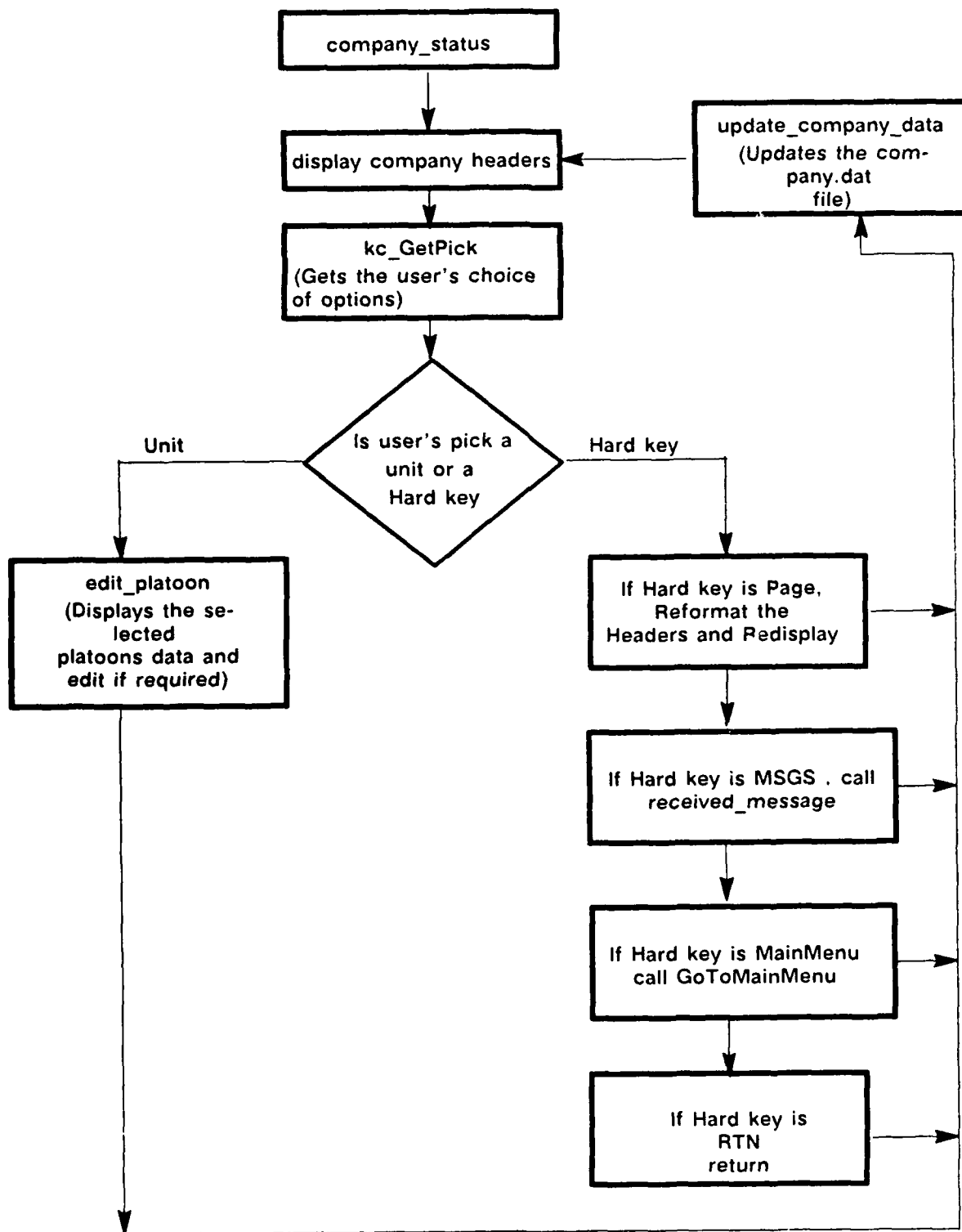


Figure A-8. COMPANY STATUS control flow.

Unit Locations

The `unit_locations()` function is shown in Figure A-9. The function is a front end to the `graphics_disp()` function. The function displays the header information from the `p_data` structure. When the user selects a unit to edit, `unit_locations()` edits the location. If the user selects the MAP DISPLAY, the function calls `graphics_disp()`.

`graphics_disp()` is the MAP DISPLAY function. `graphics_disp()` reads the unit type and size from the `p_data` structure and displays it on a GRID that is centered on the unit with the address of the CCT. `graphics_disp()` performs the scale and moves unit functions of the map.

Set-Up

The `set_up()` function is a front end to five other functions. The logic flow is shown in Figure A-10.

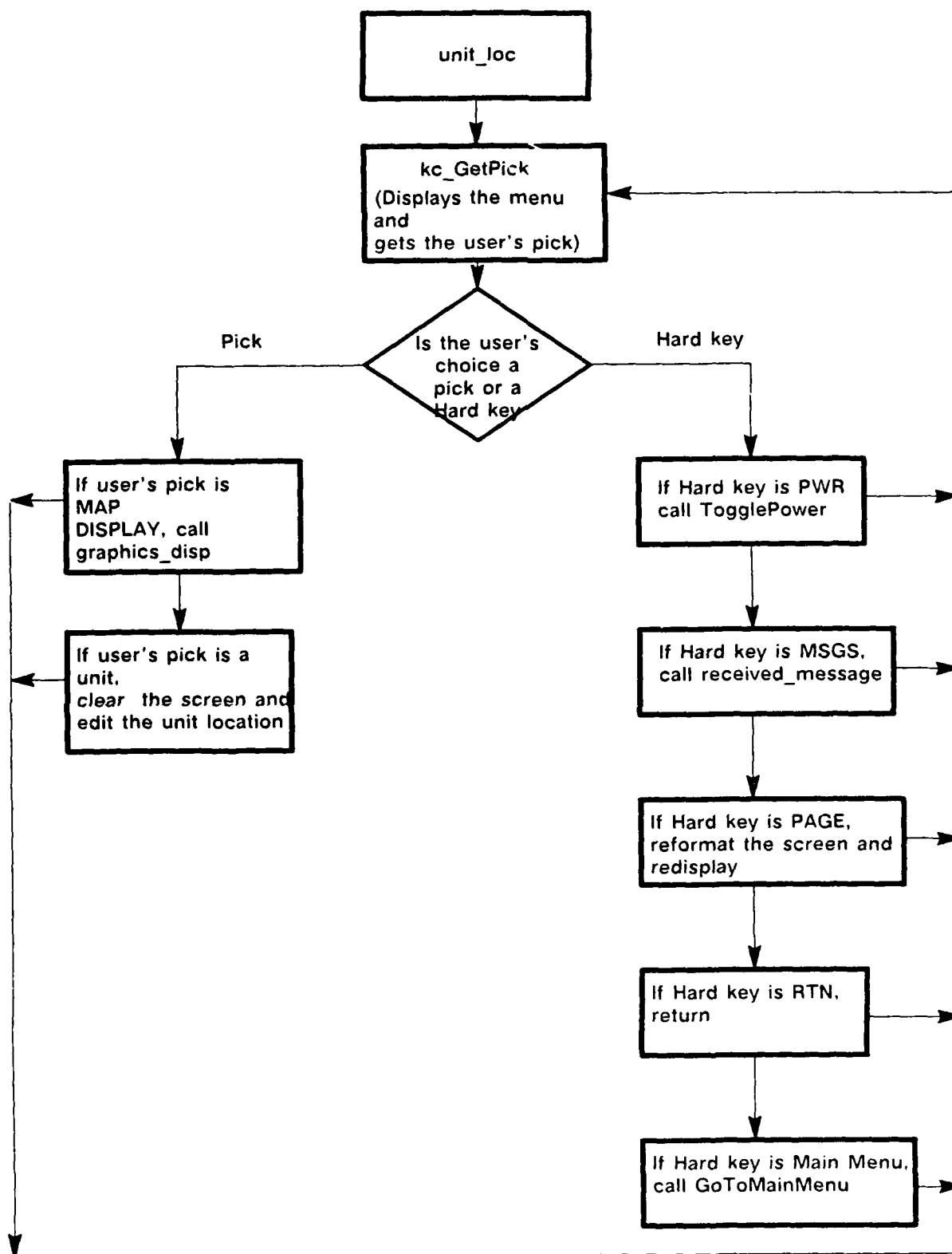


Figure A-9. UNIT LOCATIONS logic flow.

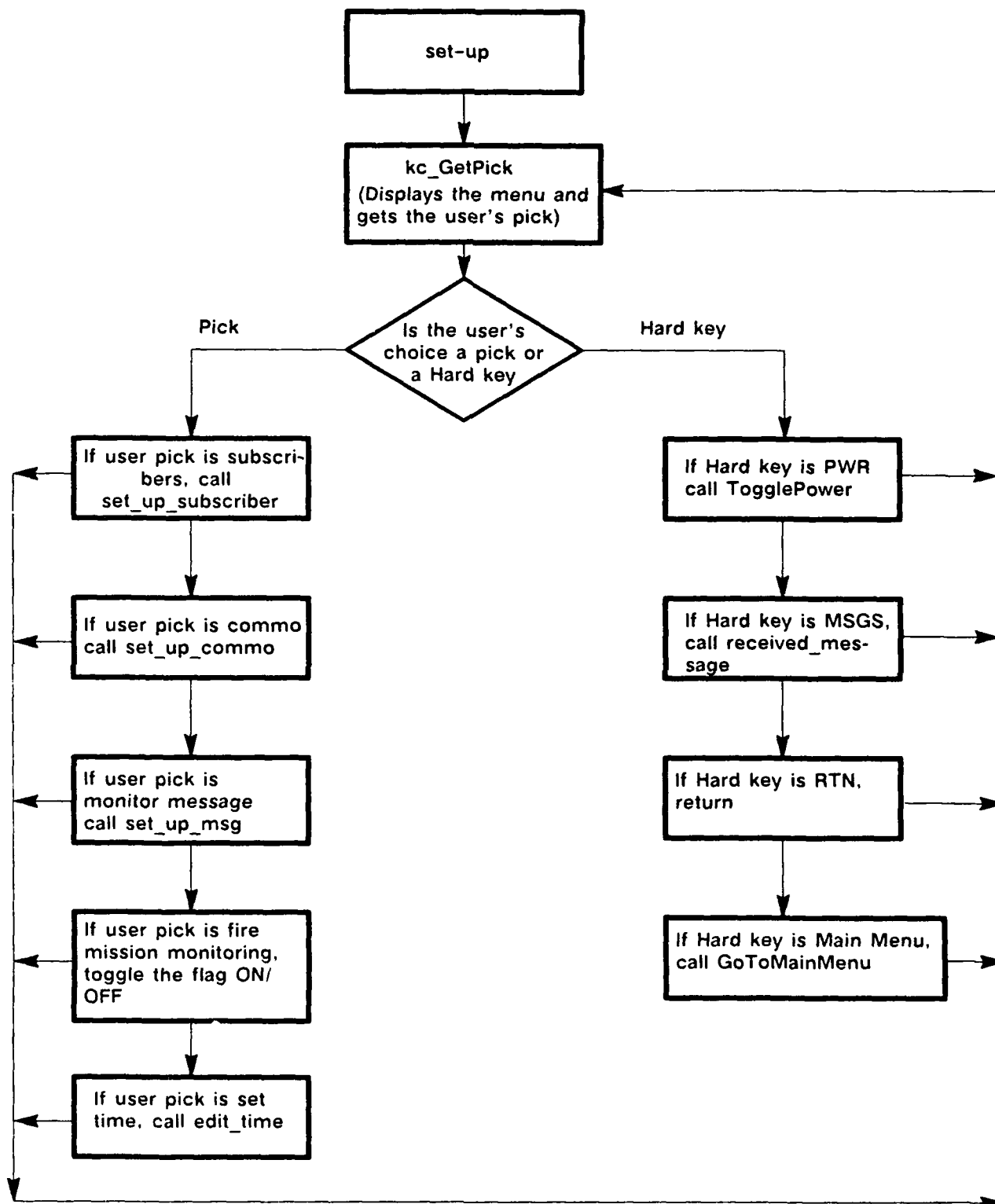


Figure A-10. SET-UP logic flow.

APPENDIX B

CCT INITIALIZATION ERRORS AND THEIR SOLUTIONS

CCT INITIALIZATION ERRORS AND THEIR SOLUTIONS

- B.1. "ERROR - FONT < HALO104.FNT > NOT FOUND." means there is no character font file. Processing is terminated. Make sure the file "halo104.fnt" is in the current directory and invoke the CCT again.
- B.2. "ERROR - DEVICE DRIVER < HALOIBME.DEV > NOT FOUND." means there is no device driver file. Processing is terminated. Make sure the file "haloibme.dev" is in the current directory and invoke the CCT again.
- B.3. "ERROR on SETPRN - #" means a printer was not initialized. Processing continues.
- B.4. "ERROR on open of company.dat" means it was not possible to open a file for the company data. Processing is terminated. Create the file and invoke the CCT again.
- B.5. "ERROR on open of firemsn.dat" means it was not possible to open a file for the fire mission data. Processing is terminated. Try to invoke the CCT again.
- B.6. "ERROR: Cannot access fire mission data" means the fire mission data were unreachable, but processing is continued.
- B.7. "ERROR on open of setup.dat" means it was not possible to open a file for the set-up data. Processing is continued. Will use system default.
- B.8. "ERROR on open of dmdstruc.dat" means it was not possible to open the file that contains the information for fire support messages. Processing is terminated. Make sure the file "dmdstruc.dat" is in the current directory, and invoke the CCT again.
- B.9. "ERROR on open of symbol.dat" means it was not possible to open the file for the graphics symbols. Processing is terminated. Make sure the file "symbol.dat" is in the current directory and invoke the CCT again.
- B.10. "ERROR on mouse input device set-up" means the software to configure the mouse failed. Processing is terminated. Make sure "halomsmi" was invoked for a Mouse Systems mouse or the device driver for a Microsoft mouse is installed. Invoke the CCT again.

- B.11. "ERROR: Touch Screen Communications." means the communications link between the CCT and the touch screen was not established. Processing is terminated. Toggle the monitor power and invoke the CCT again.
- B.12. "Status Error #" means a touch screen error was caught through the communications software. Processing is terminated. Consult the Carroll Touch user's guide to determine the exact error that occurred.
- B.13. "ERROR: On initializing with CRs" means the baud rate, parity, and number of bits initialization failed. Processing is terminated. Toggle the touch screen, and make sure the RS-232 interface is connected, and invoke the CCT again.
- B.14. "ERROR: On Software Reset" means the character software report inquiry failed. Processing is terminated. Toggle the touch screen power, and invoke the CCT again.
- B.15. "ERROR: On Error Report Enable" means the character error report inquiry failed. Processing is terminated. Toggle the touch screen power, and invoke the CCT again.
- B.16. "ERROR: Error Report Found" means an error report with the touch screen was found. Processing is terminated. Toggle the touch screen power, and invoke the CCT again.
- B.17. "ERROR: 'Coordinate Report Mode' Character Failed" means an error occurred when a coordinate report was attempted. Processing is terminated. Toggle the touch screen power, and invoke the CCT again.
- B.18. "ERROR: 'Tracking Report Mode' Character Failed" means an error occurred when the tracking report mode was attempted. Processing is terminated. Toggle the touch screen power, and invoke the CCT again.
- B.19. "ERROR: 'Add Exit Report Mode' Character Failed" means an error occurred when the 'add exit report' mode was attempted. Processing is terminated. Toggle the touch screen power, and invoke the CCT again.
- B.20. "ERROR: 'Entry Report Mode' Character Failed" means an error occurred when the 'entry report' mode was attempted. Processing is terminated. Toggle the touch screen power, and invoke the CCT again.

- B.21. "ERROR: 'Hardware Function On' Character Failed" means an error occurred when the 'enable hardware handshaking' mode was attempted. Processing is terminated. Toggle the touch screen power, and try to invoke the CCT again.
- B.22. "ERROR: 'Transfer On' Character Failed" means an error occurred when the mode character instruction, which sets up the touch screen to send continuous reports to the PC was attempted. Processing is terminated. Toggle the touch screen power, and invoke the CCT again.
- B.23. "ERROR: 'Touch Scanning On' Character Failed" means an error occurred when the 'enable touch' mode was attempted. Processing is terminated. Toggle the touch screen power, and invoke the CCT again.

APPENDIX C
SUPPORTING FILES FOR THE CCT

SUPPORTING FILES FOR THE CCT

There are a number of files required for the operation of the CCT. These files contain information required for program initialization, message creation, graphics support, and communications support. This section will explain the supporting files, their file formats, and valid field values.

PROGRAM INITIALIZATION FILES

The program initialization files all end with the extension .dat. The files are company.dat, dmdstruct.dat, firemsn.dat, locator.dat, and screen.dat.

company.dat

The company.dat file contains all unit data for the subscribers. The COMPANY DATA function reads its information from this file.

The file includes a line of data for each unit. There are 14 fields in each data line delimited by colons on the data line. An example entry from the company.dat file is

```
BN CDR:A:1:GREEN:1134:74005200:NONE:1.0:1.0:1.0:1.0:N/G:1:4:
```

company.dat Fields

The fields are defined as follow:

- Field 1 is the NAME field. BN CDR is entered here.
- Field 2 is the ADDRESS field. In the above example, A is the address.
- Field 3 is the communications NET field.
- Field 4 is the STATUS code field.
- Field 5 is the TIME field.
- Field 6 is the LOCATION field.
- Field 7 is the ENEMY ACTIVITY field.
- Field 8 is the PERSONNEL STATUS field.
- Field 9 is the AMMO STATUS field.
- Field 10 is the POL STATUS field.
- Field 11 is the EQUIPMENT STATUS field.
- Field 12 is the REMARKS field.
- Field 13 is the UNIT TYPE field.
- Field 14 is the UNIT SIZE field.

company.dat Usage

The company.dat file is used by the COMPANY STATUS, UNIT LOCATIONS, and SET-UP functions. The file is read and written whenever these update subscriber information.

The company.dat file, when updated, will have either NONE or N/G entered for any field that is blank.

dmdstruct.dat

This file contains the data for the DMD messages. The file is composed of lines that contain the data options for the dmd_message field menus. The dmdstruct.dat file is never written by the CCT program, but is set up before program start by system administration personnel.

dmdstruct.dat Format

The file is formatted like the company.dat file; fields are delimited by colons. An example entry is

STD:EST:

The menu choices for the GRIDZONE field are stored here.

dmdstruct.dat Usage

The dmdstruct.dat file is read every time a FIRE SUPPORT message field is entered. Each message field has a number that corresponds to the line number of the field option in the file. When the field options are required, the line of data in the file are parsed and displayed to the user.

This file must exist before the FIRE SUPPORT messages will work properly.

firemsn.dat

This file contains fire mission data for use by ACTIVE FIRE MISSIONS.

firemsn.dat Format

The format of the data is the same as company.dat. An example entry is

F01:1235:AB1230:71205630::

firemsn.dat Fields

Field 1 is the observer. The observer's NAME or ADDRESS will be filled in here.

Field 2 is the FRGRID receipt time.

Field 3 is the TARGET NUMBER.

Field 4 is the TARGET LOCATION.

Field 5 is the FIRING UNIT.

firemsn.dat Usage

The file is updated whenever a fire mission is started or updated. The file does not need to exist at program start-up. If it does, the information in the file will be used to initialize the F-MSNS count on the STATUS LINE.

locator.dat

This file contains information about the type of user input devices used on the PC.

locator.dat Format

The file consists of a single line of data consisting of two fields. The fields are separated by a space. An example listing is

1 1

locator.dat Fields

Field 1 is the DEVICE TYPE. This is the mouse type. Valid values are

1 - Generic Mouse

2 - Microsoft Mouse

Field 2 is the device interrupt number. It is always 1.

locator.dat Usage

locator.dat is read once at program initialization. If the file does not exist, the default user input device configuration is used.

screen.dat

The screen.dat file contains the data necessary to configure the physical appearance and operating parameters of the user interface. Border and background colors, height, width, the color of characters, and the display device driver mode are set in this file.

screen.dat Format

screen.dat contains a line of data for each field. The line contains the field name, a delimiter, and the value to be set. An example entry is

BORDER - -1

screen.dat Fields

The screen.dat fields are

BORDER, BACKGROUND, HEIGHT, ASPECT, COLOR, DISPLAY_COLOR, MODE, DWX1, DWY1, DWX2, DWY2, UWX1, UWX2, UWX1, UWX2, UWX2, UWX2, STH, STW, PRINTER.

Fields *must* be in uppercase.

The BORDER and BACKGROUND fields control how the screen is cleared upon a refresh. A value of -1 will not clear the screen on refresh. 1 will clear the screen on refresh. The default is -1.

HEIGHT, ASPECT, COLOR are parameters of characters. The HEIGHT is the height of characters relative to the number of lines in the display. ASPECT is the ratio of the height-to-width of the character. COLOR is the color of the character. COLOR is a code corresponding to the color codes of the color graphics adapter (CGA) card. Defaults are 1.0, 1.0, 15 (White).

MODE is the mode of the display device driver. The default is 4 (for the EGA card).

DWX1, DWY1, DWX2, DWY2 are the screen row and column specifications. The screen is zero; zero point is the lower left corner of the screen. The defaults are 0.0, 24.0, 80.0, 0.0 for an 80-column, 24-row display.

UWX1, UWY1, UWX2, UWY2 are the screen row and column specifications. They are identical to the DWX1, DWY1, DWX2, DWY2 coordinates.

STW and STH are character height and width "fudge" factors. Using these values, the spacing of the characters can be adjusted to make them more readable.

screen.dat Usage

screen.dat is read once at program initialization. If the file does not exist, the program uses default values. Not all fields need to be specified if the defaults will be used.

MESSAGE FORMAT FILES

The message format files are required for the creation and editing of the infantry and fire support messages. The format files all end in .fmt. The format files fall into two categories: Infantry and Fire Support.

All message format files contain the number of lines as the first line in the file.

Infantry Message Format Files and Formats

An example Infantry Message format file is

```
7
TO 1-CHAR 1
FROM 1-CHAR 1
NATURE/TIME 240-CHARS 240
TIME-OF-MOVE 240-CHARS 240
SPECIAL-INST 240-CHARS 240
TIME/PLACE 240-CHARS 240
ACK 80-CHARS 80
```

Figure XX: Infantry Message Format File.

There are three fields on each line of the file, separated by a space.

Field 1 is the field name (i.e., TO, FROM, NATURE/TIME).

Field 2 is the UNITS field. This will be displayed on the message status line.

Field 3 is the number of characters allowed for this field.

The field names must not contain any white space (spaces or tabs); therefore, words are separated by a "-" or a "/".

The number of lines of data must match the number at the top of the file.

Fire Support Message Format Files and Formats

Fire Support format files contain more information than the Infantry Message formats. Field name, number of characters, units, defaults, row and column, parent and child fields are specified in the format file. An example is

```
19
DEST 1-CHAR - 1 0 0 1 1
ORI 1-CHAR - 1 0 0 2 1
DIR (10-MILS) - 3 0 0 3 1
EAST (10-M) - 4 0 0 4 1
NORTH (10-M) - 4 0 0 5 1
ALT (10-M) - 3 0 0 6 1
GRID - STD 2 0 0 7 1
TGT - N/G 16 7 7 8 1
TGT-SUBTYPE - N/G 16 7 8 9 1
ATTITUDE - 0000 31 0 0 10 1
DOP - N/G 16 0 0 1 20
RAD/LGTH - N/G 16 0 0 2 20
WIDTH - N/G 16 0 0 3 20
STR - N/G 16 0 0 4 20
SHELL/FZ - NO-PREF 16 0 0 5 20
CONTROL - ADJ-FIRE 16 0 0 6 20
ANGLE - LO 2 0 0 7 20
PRI - 2 2 0 0 8 20
OB 2-CHARS - 2 0 0 9 20
```

Sample Fire Support Message Format File

The fields in this message are

- Field 1: Field Name. This will be displayed to the user as is.
- Field 2: Units. This will be displayed on the message status line.
- Field 3: Default. If there is no default, a "-" is given.
- Field 4: Number of characters or menu choices.
- Field 5: Parent Field. This field is given a value of 0 if this is not a linked field. If this is a linked field, and this is the parent field, the line number of the field is inserted. If this is a linked field, and this is a child field, the line number of the parent field is inserted.
- Field 6: Child Field. This field is given a value of 0 if this is not a linked field. If it is a linked field, the line number of the child field is inserted.
- Field 7: Row. This is the row of the display screen that the field will be entered.
- Field 8: Column. This is the column of the display that the field will start.

The fields of the message must match the corresponding function in the program code or the program will not produce the correct results.

GRAPHICS DEVICE SUPPORT FILES

A number of device drivers and font files must be loaded at program initialization time. These are

haloibme.dev - A HALO device driver for the IBM-EGA card. The program must have a device driver to load at program start. The program will abort if it cannot find this file.

halol04.fnt - This is the HALO-supplied FONT file. The program will abort if it cannot find this file.

halomsmi.com - This is a Summagraphics Mouse device driver supplied with the HALO library. The program will abort if the device driver is not loaded before program start.

The .dev and .fnt files must reside in the same directory as the CCT program.

(Note. **IMPORTANT!** You MUST have a software license from Media Cybernetics, Inc., for the HALO graphics package to use this software.)

APPENDIX D

TACTICAL MESSAGES AND THEIR FIELDS

TACTICAL MESSAGES AND THEIR FIELDS

D.1. WARNING ORDER - The Warning Order message is used by the commander to relay mission orders and preparations for movement.

a. TO	1 character
b. FROM	1 character
c. NATURE/TIME	240 characters
d. TIME-OF-MOVE	240 characters
e. SPECIAL-INST	240 characters
f. TIME/PLACE	240 characters
g. ACK	80 characters

D.2. SITREP - The Situation Report is used to relay unit status information.

a. TO	1 character
b. FROM	1 character
c. UNIT-LOC	8 digits
d. ENEMY-ACTIVITY	240 characters
e. PERS-STR	3 digits (percent)
f. AMMO-STAT	3 digits (percent)
g. POL-STAT	3 digits (percent)
h. EQUIP-STAT	3 digits (percent)
i. REMARKS	240 characters

D.3. FRAGO - The FRAGO message changes mission instructions during execution.

a. TO	1 character
b. FROM	1 character
c. SITUATION	120 characters
d. MISSION	120 characters
e. EXECUTION	120 characters
f. COMMAND/CONTROL	120 characters

D.4. SPOTREP - The Spot Report (SALUTE) is used to relay enemy sighting information.

a. TO	1 character
b. FROM	1 character
c. SIZE	80 characters
d. ACTIVITY	120 characters
e. LOCATION	8 digits
f. UNIT	80 characters
g. TIME	4 digits
h. EQUIP	120 characters

D.5. CONTACT REP - The Contact Report is used to relay enemy contact information.

a. TO	1 character
b. FROM	1 character
c. CONTACT	80 characters
d. DIR-OF-TVL	20 characters
e. ENEMY-INFO	120 characters

D.6. NBC 1 - The NBC 1 message reports a sighting of nuclear, biological, or chemical (NBC) blast.

a. TO	1 character
b. FROM	1 character
c. OB-LOC	8 digits
d. DIR	8 digits
e. DET-DATE/TIME	20 characters
f. ATK-LOCATION	20 characters
g. DELIVERY-MEANS	80 characters
h. BURST-TYPE	20 characters

D.7. NBC 4 - This message reports dosage and damage data as a result of NBC activity.

a. TO	1 character
b. FROM	1 character
c. BURST-TYPE	40 characters
d. READING-LOC	20 characters
e. DOSE-RATE	20 characters
f. READING-DATE/TIME	20 characters

D.8. MIJI - This message relays jamming and other interference data.

a. TO	1 character
b. FROM	1 character
c. STATION-ID	40 characters
d. STATION-LOC	40 characters
e. EQUIP-AFFECTED	120 characters
f. SIGNAL-DATA	120 characters
g. DATE/TIME	20 characters
h. MIJI-EFFECT	120 characters
i. NAME/RANK	40 characters

D.9. MINEREP - The Mine Report relays mine field information on friendly mine fields.

a. TO	1 character
b. FROM	1 character
c. FIELD-TYPE	40 characters
d. FIELD-NUMBER	40 characters
e. COMP-DATA/TIME	20 characters

f. METH-OF-LAY	120 characters
g. LANES/GAPS	120 characters
h. FIELD-MARKING	60 characters
i. CHANGES	120 characters

D.10. MORTARREP - The Mortar Report relays enemy mortar shelling information (not implemented).

D.11. OBSTACLE REP - This message relays enemy obstacle information.

a. TO	1 character
b. FROM	1 character
c. MAP-SHEET-#	8 digits
d. DATE/TIME	20 characters
e. LOCATION	8 digits
f. TYPE	120 characters
g. ENEMY-WEAPONS	120 characters
h. REMARKS	120 characters

D.12. PATROL REP - The Patrol Report contains information about local terrain, enemy positions, and map reconnaissance from a patrol.

a. TO	1 character
b. FROM	1 character
c. PATROL-SIZE	120 characters
d. PATROL-TASK	120 characters
e. DEPART/RETURN-TIME	40 characters
f. ROUTES-OUT/BACK	120 characters
g. TERRAIN-INFO	120 characters
h. ENEMY-INFO	120 characters
i. MAP-CORRECTIONS	120 characters
j. ENEMY-ENCOUNTER	120 characters
k. PATROL-CONDITION	120 characters
l. MISC-INFO	120 characters
m. CONCL/RECOMMEND	120 characters

D.13. SHELREP - The Shelling Report contains information about enemy shelling.

a. TO	1 character
b. FROM	1 character
c. OBSR-LOCATION	8 digits
d. MISSILES-ORIGIN	20 characters
e. TIME-OF-ATTACK	20 characters
f. TIME-TO-ILLUM	20 characters
g. AREA-ATTACKED	80 characters
h. DELIVERY-MEANS	80 characters
i. NATURE-OF-FIRE	80 characters
j. SHELLS-NUMBER/TYPE	80 characters
k. FLASH-TO-BANG-TIME	20 characters
l. DAMAGE	120 characters

D.14. PASSAGE OF LINES - This message relays to a unit that another friendly unit is passing through its lines.

a. TO	1 character
b. FROM	1 character
c. ASSEMBLY-AREAS	80 characters
d. PASSAGE-TIME	20 characters
e. ATTACK-POSITION	20 characters
f. LANES-AND-POINTS	120 characters
g. RECOG-SIGNALS	120 characters
h. CONTACT-POINT	80 characters
i. RELEASE-POINT	80 characters
j. ROUTES	240 characters

APPENDIX E

LOGISTICAL MESSAGES AND THEIR FIELDS

LOGISTICAL MESSAGES AND THEIR FIELDS

E.1. EMER AMMO REQ - This message is a request for immediate ammunition resupply.

a. TO	1 character
b. FROM	1 character
c. AMMO-TYPE	40 characters
d. NO-REQUESTED	40 characters

E.2. RATION REQ - The Ration Request is a request for meals and indicates delivery information.

a. TO	1 character
b. FROM	1 character
c. REQUEST-DATE/TIME	40 characters
d. DELIVERY-DATE/TIME	40 characters
e. MEALS-NUMBER/TYPE	40 characters
f. WATER-NECESSARY	40 characters
g. LINK-UP-LOCATION	20 characters

E.3. SPLY/AMMO/POL REQ - This is a general request for supplies message.

a. TO	1 character
b. FROM	1 character
c. UNIT-SIZE	20 characters
d. REQUEST	80 characters
e. NO-REQUESTED	20 characters

E.4. AMMO STATUS REP - This message contains status information for ammunition.

a. TO	1 character
b. FROM	1 character
c. AMMO-TYPE	40 characters
d. STATUS	3 digits (percent)

E.5. BATTLE LOST SPOTREP - The Battle Lost Spot Report contains the time, type, and disposition of equipment lost in battle.

a. TO	1 character
b. FROM	1 character
c. TIME-OF-LOSS	4 digits
d. EQUIP-EVACUATED	80 characters
e. EQUIP-DESTROYED	80 characters
f. EQUIP-ABANDONED-LOC	80 characters

E.6. EQUIP STATUS REP - This is a general equipment status report.

a. TO	1 character
b. FROM	1 character
c. EQUIP-NAME	20 characters
d. STATUS	3 digits (percent)

E.7. NUCREP - This message is used to relay nuclear strike information.

a. TO	1 character
b. FROM	1 character
c. OB-LOC	8 digits
d. FLASH-GROOVE-AZ	4 digits
e. ATTACK-TIME	4 digits
f. ILLUM-TIME	4 digits
g. AREA-ATTACKED	20 characters
h. DELIVERY-#/NATURE	80 characters
i. NATURE-OF-TOXIC/ BURST TYPE	80 characters
j. BOMBS-NUMBER/TYPE	20 characters
k. FLASH/BANG-TIME	10 characters
l. DAMAGE-CRATER-DIAM	10 characters
m. FIREBALL-WIDTH	10 characters
n. CLOUD-HEIGHT-10 sec	10 characters
o. CLOUD-WIDTH-10 sec	10 characters

E.8. PERS BATTLE LOSS REP - This message contains information about personnel battle casualties.

a. TO	1 character
b. FROM	1 character
c. INCIDENT-DATE/TIME	20 characters
d. INCIDENT-LOC	20 characters
e. CASUALTY-TYPE	20 characters
f. CASUALTY-EVACUATION- LOC	20 characters

E.9. PERS DAILY SUMMARY - This message contains administrative personnel data.

a. TO	1 character
b. FROM	1 character
c. CASUALTIES	20 characters
d. ADMIN-LOSSES	20 characters
e. RETURNEES-TO-UNIT	80 characters

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E.10. POL STATUS REP - The POL Status Report contains the status of all petroleum, oil, and lubricants.

- a. TO 1 character
- b. FROM 1 character
- c. STATUS 3 digits (percent)

E.11. VEHICLE/EQUIP REP - This message contains the status of a vehicle.

- a. TO 1 character
- b. FROM 1 character
- c. VEHICLE-TYPE 20 characters
- d. STATUS 3 digits (percent)